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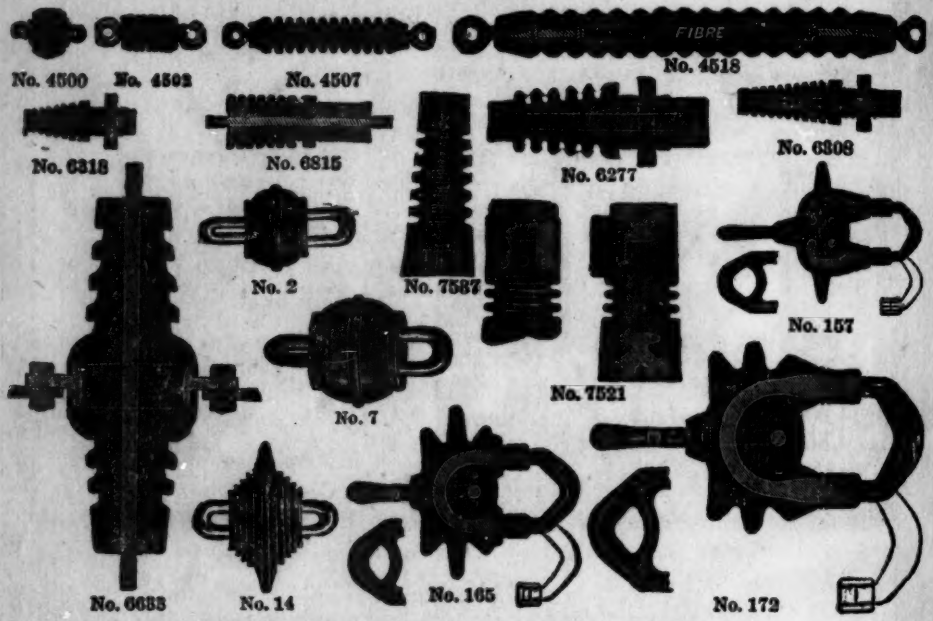

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THE OLD NAVY.

UNITED STATES NAVAL INSTITUTE PROCEEDINGS

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE OLD NAVY

By CAPTAIN J. K. TAUSSIG, U. S. Navy

The famous picture known as "The Old Navy," reproduced herewith, was taken on board the U. S. S. *Mohican* in 1888. The photographer was Assistant Surgeon H. W. Whitaker, U. S. Navy.

When Captain J. R. Y. Blakely and the writer were on duty in the Bureau of Navigation in 1913, the former had the happy thought that it would be of interest to ascertain the identity of the characters in the picture. Under his initiative, the two of us proceeded to gather what information was to be obtained from the Bureau's records, and from other sources.

A visitor to the Bureau, Rear Admiral George C. Reiter, informed us that the picture was taken on board the *Mohican*, he thought in 1886. This gave a clew for starting the research. On looking up the Navy Register for 1886 it was found that several officers conveniently near to Washington were on board the *Mohican* at that time. Among these officers are the present Rear Admirals R. F. Nicholson and E. W. Eberle, and Captain R. L. Russell. Captain Blakely sent a copy of the photograph to these three officers, and also to Chief Boatswain's Mate George A. Dueland and Chief Quartermaster Lars P. Jonsson, both retired, who were on the *Mohican* during this cruise.

The replies received from these officers and men were not only interesting, but gave sufficient information so that, with a study of the muster rolls and descriptive lists, a positive identification of the four men could be made. There had been no question as to three of them, but there was a difference of opinion in regard to the old white bearded sailor with his hands behind his head. Some thought he was John Ward, armorer; some thought he was old Norman; others said he was "Old Griff." These latter were correct, as he was finally unquestionably identified from the muster rolls and descriptive lists as John T. Griffith, Chief Carpenter's Mate. The reason for the difficulty in the identity of this man was due to the supposition that the picture was taken in 1886, while it turned out that it was actually taken in 1888. Griffith was not transferred to the *Mohican* until the latter date, and was on board for only a month. Some of the officers who were on board in 1886 when the other three men were also there, were transferred to other vessels before Griffith arrived on the *Mohican*.

The four men, with a brief transcript of their services, are:

1. GILBERT H. PURDY, who is standing addressing the others. Purdy was born in 1828, and therefore was 60 years old when the picture was taken. He was a physically powerful man and was remarkably well preserved, as is shown by the photograph. He died December 24, 1912, at San Diego, California, at the age of 84, being at the time of his death the oldest man on the retired list of the navy. During the Civil War he served as sergeant in Battery K, 4th U. S. Artillery, and as a seaman on board several naval vessels. He also had the honor of serving under Admiral Dewey on the *Olympia* during the Spanish-American War. He was transferred to the retired list on February 7, 1900. Purdy served as captain of the hold on board the *Mohican* from May 25, 1885, to August 28, 1888.

2. DAVID IRELAND, seated with arms folded. Ireland was born in 1833, and was therefore 55 years old when the picture was taken. He first enlisted in the navy on April 8, 1850, so he had seen 38 years of service when on the *Mohican*. He served on many ships in all parts of the world and died at the Mare Island Hospital on January 16, 1894, aged 61 years. He served on board the *Mohican* from May 25, 1885, to November 20, 1890, as captain of the forecastle, seaman, and captain of the hold.

3. JOHN KING, seated on ditty box. King was born in England in 1834, so at the time the picture was taken was 54 years old. He followed the sea in merchant ships for a number of years before enlisting in the navy, which he first did on April 9, 1875, he then being in his 42d year. He was finally discharged on April 2, 1896, and admitted to the Naval Home at Philadelphia. He served on board the *Mohican* from May 25, 1885, to January 25, 1899, as chief gunner's mate. The exact date of his death is not known.

4. JOHN T. GRIFFITH, seated with hands behind his head. Griffith was born at Albany, New York, December 25, 1826, being 62 years of age when the picture was taken, and the oldest man of the group. The record of his first enlistment is not at hand, but he last enlisted on October 18, 1888, and was finally discharged on December 10, 1889. He served on board the *Mohican* as chief carpenter's mate from June 3 to June 30, 1888. The date of his death is not known.

The fine type of old salt depicted here is now extinct so far as our navy is concerned. It seems, therefore, that it is fitting for the historical interest to make a record in print of some of the things that are known concerning these men. It is felt also that those of the old navy who were closely associated with the wonderful sailor men of those days, as well as those of the modern navy who never had the pleasure of such associations, will appreciate quotations from the letters to Captain Blakely written by the officers who were shipmates of the men in the picture.

Admiral Nicholson wrote:

I remember very distinctly the photo referred to in your letter. It was taken in the *Mohican* one day while we were at sea running down the trades. I was on deck and noticed the four old salts over in the port gangway, where the quartette usually congregated, and it struck me that it was a subject for a fine picture. I called Drs. Harvey and Whitaker, who were doing most of the photographic work on board ship, and suggested that they bring up a camera and catch them, which they immediately proceeded to do with the well known results.

The man standing up is Purdy, captain of the hold, who was a great big six-foot-two man from New York State. Purdy was a great disciple of Ingersoll and Tom Paine and in all probability at the time pictured was giving them something from "The Age of Reason" or "The Rights of Man."

The old chin-whiskered fellow was King, quarter gunner, a fine old sailor, but one of the old style that went ashore once a quarter and had to be

brought back by the master-at-arms each and every time, but a splendid old fellow nevertheless.

The smooth-faced fellow was Dave Ireland, who told me he was from Delaware, and I knew he corresponded with some nieces in Delaware. He had passed his earliest years in the merchant service, part of it in English ships, and often regretted that he had not joined the navy earlier. . . . . He was of a saving disposition, and I heard at the time of his death that he had 10,000 dollars in cash. I remember in Auckland once he overstayed his leave, which was quite unusual for him, and was brought on board by the police which cost him three pounds, and ever afterwards the boys of the ship would get him wild by attracting his attention and holding up three fingers. On one occasion they so riled him that he threw the quartermaster's glass at them.

The other man was "Griffin," the armorer. A very quiet, self-respecting old fellow, and the last I heard of him he was somewhere around Mare Island.

Purdy, I saw a few years ago at San Diego. He had charge of a naval militia ship down there. Old King passed his earliest years in the East India Company's Navy. The last I heard of him he was at the Naval Home in Philadelphia.

Admiral Eberle wrote:

I remember very distinctly Chief Gunner's Mate John King who is seated on the ditty box, Captain of the Hold Gilbert H. Purdy who is standing against the ladder spinning yarns, and Quartermaster Dave Ireland, who is seated against the ladder with his arms folded.

I do not remember the fourth man seated on the division tub with his hands behind his head, but I am reliably informed that he was a Chief Carpenter's Mate by the name of Griffin, or Griffith, probably the former. He was identified by Chief Boatswain McKenna, and Robert J. Niddrie, who is in the Electrical Department at the navy yard—both of whom were apprentice boys with me on the *Mohican*. They state that they remember when the picture was taken by Dr. Whitaker, and that Chief Carpenter's Mate Griffith had been previously on the *Adams* and had been transferred to the *Mohican* for passage home.[1] The Chief Carpenter's Mate of the *Mohican* was a man by the name of Brady. From their statement, and to the best of my recollection, Ward, armorer, was a smaller man than the one in the picture and wore a beard more pointed and somewhat on the style of Purdy's. They state that King and Ward had been in the British Naval Service when young men.

Purdy was a man of great physical strength and was quite a spinner of yarns. Dave Ireland, the quartermaster, made a cruise afterwards on the China Station in the *Marion* with the rate of captain of the hold. . . . .

[1] The records show that Admiral Eberle was detached from the *Mohican* before Griffith reported on board. This accounts for his doubts as to the identity.

It is stated that Old Ireland in his latter days was very thrifty and saving, and had become a tee-totaler. I also understand that he had either nieces or nephews living in Delaware. It is told of the old man that when the doctors at the hospital at Mare Island found that he had not many months to live, suggested to him that he would be more comfortable in his old days by boarding with some family in Vallejo, where he would receive the comforts of home, but he stated that he could not afford it. However, when he died, it is stated that he had about 9000 dollars saved up.

Old John King was quite a character of the old days. I recall very distinctly that he would draw what money was due him and go ashore once in three months and promptly spend it for rum, and after he was brought back on board and sobered up he always said he was happy now because he could not go ashore for another three months. Boatswain McKenna reminded me of two escapades of John King which were very amusing and very characteristic of him. Once in Corinto, Nicaragua, when King had gone ashore and was overtime, a reward was offered for him, but somehow he heard about it and when chased by the Corinto police he made for the beach and swam off to the ship, being chased by the police in a shore boat; but he made the gangway before they could catch him. When the ship was at Callao, Peru, the Chief Petty Officers' Mess decided that they would elect a new caterer, and for some reason they elected John King. King took the mess money to go ashore to buy stores, as was the custom in those days. He sent back to the ship one Edam cheese and a bag of salt for his mess, and proceeded to have a good time until brought off by the police a week or 10 days later. But he was a good and faithful old soul, and was busy from reveille to taps.

King, Purdy and Old Dave Ireland were in the habit of "hanging out" in the port gangway where you see them in the picture. No finer or more reliable seamen could be found anywhere.

From Captain Russell's letter:

King and Ireland I remember perfectly, having had Ireland for quartermaster of the watch many times when I was standing watch on the *Mohican,* and I remember to this day many of the conversations I had with Ireland, who was a very interesting old fellow, and told me a lot of his experiences. You will find by looking up the record of the Brazilian Squadron, in the early fifties, that Ireland was down there on board one of the ships. . . . .

Ireland came home on the *Pensacola,* arriving in Norfolk in 1884 after a trip around the world, and on the advice of a friend, he put about all his savings into a Norfolk bank just in time to have the bank fail and lose about everything.

The extracts quoted from the letters of Admirals Nicholson and Eberle, and of Captain Russell—which letters were written 25 years after the photograph was taken—show us how well the officers of the old navy came to know the men with whom they were shipmates. We also get from them a good insight into the

character of the old time salt. That these men were of a type unknown to the younger generation of the new navy is evident to anyone who has the opportunity of visiting a modern man-of-war; but the impression they made on their officers shows us that there was something so unique and so impressive about these faithful old sailors, that their sayings and doings leave a lasting impress on the memories of those who had the pleasure of being shipmates with them.

This picture, "The Old Navy," depicts for us a rare combination of characters. We have here in Purdy the spinner of yarns and exploiter of theories—different from the usually accepted ones—but always of sufficient interest to guarantee an audience. In Ireland we have the serious-minded listener. A man of sturdy character who loved his ship and who loved to stay on board—preferring to save his money to spending it on a good time. King typifies the sailor of the stories: One who loved rum and who spent his money freely whenever he had the chance. He was the type who was absolutely reliable when on board ship, but did not see that the beach was for any other use than a place where one could get drunk. Griffith shows us the old man who has matured in the service—the kind that acquired none of the bad traits, but all of the good traits of the old time sailor.

While all of these men undoubtedly had their individual ideas of right and wrong, and while there is no doubt but that these ideas differed widely, all the evidence in regard to them—which evidence is true in general for many of the other old salts of their day—shows in all of them a great outstanding quality. This was their faithfulness and their energy combined. The following, which Admiral Eberle wrote about King is true for all of them: "He was a good and faithful old soul, and was busy from reveille to taps."

It is hoped that others who have information concerning such sailormen as are shown in this picture, will make a record in writing of it, so that the famous type will not be lost to the coming generations.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

PROMOTION IN THE NAVY

By LIEUT. COMMANDER F. A. L. VOSSLER, U. S. Navy

Two systems of promotion in the navy have gone by the board and we are now struggling with the third. If we accept the maxim that "Proof of the pudding is in the eating," we must agree that this third and present system of promotion by election, rejection, and selection is not very satisfactory. In looking for the causes of restlessness prevailing in the service now-a-days, the present method of promotion may, among other things, be properly looked upon askance. Nothing is more disconcerting to the ambitious individual than suddenly to see his future advancement and success, as well as the welfare of his family, dangling by a thread.

In dealing with this vital question in connection with the officer personnel, too much veering from one extreme to the other has been done. First, there was promotion by seniority—a pernicious system, preventing even the most brilliant officer from being advanced before his regular turn came, no matter how incapable those ahead of him were. Then with a view to getting rid of the incompetents, a law was enacted providing for the compulsory retirement of a certain number of officers each year. This served to relieve the service of many officers who had undoubtedly missed their calling, but it provided no way for the more efficient officers to get to the top more quickly than those having less ability. So, still another law was passed providing for promotion to the higher grades by selection only, thus going to the other extreme.

It is practically impossible to evolve a system of promotion which will be entirely satisfactory, at all times, to all those who are affected by its provisions. However, the writer believes that the present system of promotion is not as satisfactory as it should be, as evidenced by the numerous resignations submitted since

"selection up" became effective. Consequently, it is with the idea of finding a better system of promotion in the navy that the subject is discussed in this paper.

Before an improvement over the present method can be suggested, it is necessary to consider what is wanted.

The principal object in view is to improve the efficiency of the navy, and the navy, after all, is just as efficient as the officers make it—no more and no less. It follows then, that the whole naval establishment would be benefited by any change in the present scheme of promotion which would improve the morale of the officers or inspire them to exert greater effort for the improvement of the service.

The value of an officer to his service (aside from his professional ability) is similar to that of other men, and is in proportion to the following conditions:

(1) His interest and pride in the service.

(2) A degree of assurance that he will be promoted from grade to grade in a reasonable length of time, provided he works and performs his duties conscientiously and effectively.

(3) The manner in which he is able to live and support his family as a result of his effort.

(4) The hope of assignment to duties in the service commensurate with his rank and abilities.

(5) The confidence which he has in the fairness and justice of the system of advancement under which he works.

(6) A degree of assurance that his life's effort will produce sufficient income after retirement from active duty to support him and his family in old age.

Let us now analyze the methods of promotion which we know, with a view to combining the elements in them that will most nearly meet the above requirements.

I. PROMOTION BY SENIORITY

Disadvantages:

(1) Discourages initiative.

(2) Fosters perfunctory and indifferent performance of duty.

(3) Offers no more reward for efficiency than it does for inefficiency.

(4) Prevents the most capable officers from reaching the top first.

(5) Makes it possible for incompetent officers to reach the most important positions, both in peace time and in war.

(6) Does not eliminate the incapable and undesirable officers.

(7) Does not provide for a flow of promotion.

Advantages:

(1) Inspires confidence in regard to future promotion and assignment to duty, thus largely doing away with discontent.

II. SELECTION OUT

Disadvantages:

(1) Provides no means for the most meritorious officers to reach the top ahead of the incompetent and dilatory ones.

(2) Requires (after a few years of operation) many very capable officers to be selected out, and their services thus lost to the navy.

(3) Causes, as a result of (2), the future promotion of *all* officers to become uncertain, producing discontent and lowered morale.

(4) Does not enable a Board of Selection to determine the relative standing of an officer in his grade, due to insufficient data shown in fitness reports.

Advantages:

(1) Eliminates the incapable, dilatory, and least useful officers, as well as their undesirable influence on those with whom they serve.

(2) Warns the individual to exert an effort sufficiently great in the performance of duty to keep ahead of the class from which "selections out" are made.

(3) Affords a certain amount of confidence in future promotion to those whose records are clear and whose efficiency is unquestioned.

(4) Provides for a flow of promotion.

III. SELECTION UP

Disadvantages:

(1) The difficulty for a selection board to determine from the fitness reports the relative merit of officers eligible for promotion.

Rear Admiral Wm. S. Sims, U. S. N., in a letter headed "Pro-

motion by Selection. Fundamental Defects of Present System," published in the service papers in the summer of 1919, states:

> These reports (referring to reports of fitness) do not enable the board to determine the relative merits of officers, and for the following reasons:
>
> (a) They are individual reports made by relatively a very few of the hundreds of officers in the grades above the candidates, and consequently they do not express the service reputation of these officers.
>
> (b) Moreover, as these reports extend from the beginning of an officer's career up to date, there is only a small proportion of them which concern an officer's *present* abilities, and from this very small number of reports, it is all the more impossible to arrive at the candidate's service reputation—upon which alone his relative merit can be established.
>
> (c) Not only is it impossible, from a consideration of a certain officer's fitness reports, to determine his service reputation, but it is equally impossible to determine his fitness as compared with that of the other officers of his grade.
>
> (d) This impossibility of determining the relative fitness of officers is due to the well-known fact that reports of fitness are of practically uniform merit, being generally much too favorable.

(2) Causes lack of confidence on the part of every officer, in future advancement. This naturally results in a dissatisfied personnel.

(3) Places a premium on inaction in cases where progressiveness and initiative may result in occasional failure, rather than success. In other words, the system tends to stunt initiative since the probabilities of reward in the form of selection for promotion are possibly greater when an officer's record is free of blemishes, than if his record is excellent but marred by one or two adverse reports. One mistake on the part of an officer (when a report of this mistake is placed on his record) may result in his being "passed over" by the Selection Board, thus humiliating and severely punishing him. On the other hand, an officer is not necessarily advanced more quickly on account of his having demonstrated unusual ability in a few instances, thus making a good record better. In this system of promotion, to do what is required means (in most cases) advancement; while to attempt more than that, if not successful, *may* result in humiliation and punishment. The professional activities of a naval officer should in no way be influenced by the principle of personal "safety first."

(4) "Selection up" does not provide for eliminating the undesirable and incompetent officers from the service. The present law provides for their automatic retirement at certain ages if not promoted, but this provision operates so slowly that the bad effect

on the service of their remaining on active duty is not eliminated. Thus, under this system, officers who are passed over by the Selection Board may remain in the service for many years, forming an element in the navy of discontent and contamination.

(5) When an officer is "passed over" by the Selection Board, he has no redress, no matter what the circumstances are. He is not notified why he was found unqualified for promotion. In fact, he is not even told that he has been rejected. He is totally ignored in this respect. To the conscientious officer this is most humiliating and discouraging. Yet, the system pre-supposes that this same officer will go cheerfully on, exerting greater effort than ever to perform his duties, not knowing, in many cases, why he has been placed in the "discard." If it were humanly possible for him to do this, how is an officer to know that he is not exerting a special effort along the same lines of his profession which was mainly the cause of his rejection? For example, the Selection Board might find an officer unqualified for promotion on account of his having been assigned to engineering duties for an unusually long period of time. Under the present system, such an officer might continue to do engineering duty for years—and quite satisfactorily, too—without knowing that he had been rejected for that very reason.

(6) The personnel of practically every Selection Board is different from the preceding one. This cannot help but result in certain changes in policy with regard to making selections, as evidenced by the fact that frequently in the past an officer rejected by one selection board has been selected by a subsequent board, while in the meantime the officer under consideration has not even had a change of station or duty, nor time to further demonstrate his ability or inability. Since the action taken by *both* boards in these cases—of which there have been many instances—cannot be correct, it follows that in all such cases some injustice has been done, either to the individual or to the service.

(7) This system fosters more or less jealousy among the officers, which, in turn, reduces cooperation and coordination throughout the service.

(8) Fails to provide for a flow of promotion.

(9) It does not necessarily result in placing the most capable officers at the top of each grade.

Advantages:

(1) Reduces the probability of wholly incompetent officers being promoted to high rank.

(2) Places the less efficient officers in each grade below the more efficient ones.

Thus we see that each of the three methods considered have some good and some bad points. Now, if a system of promotion could be adopted which would embody the advantages, and at the same time do away with the disadvantages enumerated above, we would certainly have a system far superior to any yet tried. The writer believes that this can be accomplished in the following manner:

Retain in effect the present laws providing for retirement due to age in grade, and for a Board of Selection.

Repeal the law now in force governing selections, and substitute a law for it, to read in substance as follows:

(a) The Board of Selection *may*, at its discretion, once during each calendar year, select out for compulsory retirement from the grade of permanent commander in the navy, a number of officers not to exceed 5/10 of 1 per cent of the total number of officers in that permanent grade, as shown by the navy register on the first day of January of the year in which the Selection Board meets. The officer, or officers so selected out shall be the one, or those, in the permanent grade of commander whom the board considers of least service to the government in that grade.

(b) The Selection Board *may*, at its discretion, once during each calendar year, select out for compulsory retirement, from the grades of permanent lieutenant and permanent lieutenant commander in the line of the navy, a number of officers from each of these grades, not to exceed 1 per cent of the total number of officers in each of these permanent grades as shown by the Navy Register on the first day of January of the year in which the Selection Board meets. The officers so selected out shall be those in the grades of permanent lieutenant and permanent lieutenant commander whom the board considers of least service to the government in those grades.

(c) Whenever any officer is selected out for compulsory retirement, in accordance with the provisions of paragraphs (a),

or (b), he shall have the right to demand a naval court of inquiry, in order that he may have an opportunity to show why he should not be retired in this manner.

(d) And, provided further that any officer designated for compulsory retirement as provided for in paragraphs (a), or (b), shall, upon being placed on the retired list of the navy, receive, annually, while on inactive duty, 2½ per cent of the pay of the permanent grade in which he retired, for each year, or fraction thereof, of service which he has performed on the active list in the navy or marine corps.

(e) After having complied with paragraphs (a) and (b), the Selection Board *may*, at its discretion, select for promotion from those officers who are eligible for promotion to the next higher grade, from the grades of permanent captain, commander, and lieutenant commander, in the line of the navy, a number of officers in each of these grades, not to exceed 3 per cent, or fraction thereof, of the number of officers in each of these permanent grades to be promoted during the calendar year in which the Selection Board meets. The officer, or officers, so selected for promotion in each grade, shall be placed at the head of the list of officers who are being promoted to the same grade at the same time, and shall take precedence there according to his standing on the navy list in the permanent grade from which he is being promoted; provided, however, that no officer so promoted shall be placed, on the list of the grade to which he is promoted, above any other officer in that grade who has previously advanced to that grade in this manner.

(f) If the Selection Board designates any officer for promotion as provided in paragraph (e), it shall be the duty of the board to select that officer, who, in the opinion of the board, is professionally superior to any other officer in the grade from which he is being promoted, except as provided in paragraph (e), when more than one officer is specially selected for promotion to a single grade.

(g) All officers in all grades in the line of the navy who are not selected out for compulsory retirement, or who are not specially selected for promotion, as herein provided, shall be promoted according to seniority, after having qualified by examinations, in accordance with existing laws.

(h) And provided further, that hereafter, in order that officers of the navy or marine corps may enjoy, to a certain degree, the same freedom of action, in regard to retirement, as is now accorded the enlisted force of these services, said officers may, at their own request, be transferred to the retired list after 20, or more, years of active service in the navy or marine corps, as the case may be; and when so transferred an officer shall receive, annually, for each year of active service in the navy or marine corps, 2½ per cent of the annual pay of the permanent grade in which he was at the time of his retirement.

GENERAL DISCUSSION

In order to illustrate the system of promotion which has just been outlined, let us take an example and work it out, assuming that there are 4600 officers of the line in the navy on January 1 and that a class of 400 midshipmen graduate from the Naval Academy in June and receive their commissions as ensigns. Let us assume, also, that the officers of the line are to be distributed in the different grades according to the present law; that is, 1 per cent in the grade of rear admiral, 4 per cent in the grade of captain, 7 per cent in the grade of commander, 14 per cent in the grade of lieutenant commander, 32½ per cent in the grade of lieutenant, and 41½ per cent in the grades of junior lieutenant and ensign.

A detailed explanation follows the table.

Grade	No. in each grade. Basis, 4600 total in navy (1)	No. in each grade which may be "selected out" (2)	No. in each grade, after selections out and adding 400. Basis 4977 in navy (3)	No. in each grade increased by (4)	Total promotions in each grade (5)	No. selected 'up' (6)
Rear admirals.	46	None	50	4	4	..
Captains	184	None	199	15	19	1
Commanders ..	322	2	348	26	45	2
Lieut. comdrs .	644	6	697	53	98	3
Lieutenants ...	1495	15	1618	123	221	..
Lieuts. (j.g.) and ensigns.....	1909	None	2065	156	400	..

Total selected out, 23.
From 4600, subtract 23 4577
Add new ensigns..... 400
Basis of new apportionment... 4977

Total selected up, 6.
For selections "up", take three per cent, or fraction thereof of number in column (5).

In the table, *column (1)* shows the number of officers allowed in each grade, figured on the basis of 4600 line officers in the navy; *column (2)* shows the maximum number of officers in the grades of commander, lieutenant commander, and lieutenant which may be selected out for compulsory retirement in accordance with the provisions of paragraphs (a) and (b). (Note that the Selection Board is not required to select out *any* officers. The table shows the maximum number the board is allowed to select out.) *Column (3)* shows the number of officers allowed in each grade after deducting those "selected out," from 4600, and then adding 400, due to the graduation of midshipmen; *column (4)* shows the increase in each grade due to the net increase in the total number of officers in the navy, as a result of the graduation of midshipmen; *column (5)* shows the total number of promotions to each grade. This is the sum of the increase shown in column (4) and the vacancies created in each grade due to the promotions from that grade; and *column (6)* shows the number of officers in the grades of captain, commander and lieutenant commander which *may* be specially selected up to head the list of those being promoted to these respective grades. (Note that the Selection Board is not required to "select up" *any* officer, from those eligible to be promoted. The table shows the maximum number the board is allowed to "select up.")

The writer claims that, if put into operation, this system of promotion would accomplish the following desirable results, all on the side of the advantages as set forth elsewhere in this article; and that practically all of the disadvantages mentioned would be eliminated:

(1) It would rid the service of the incapable and unsatisfactory officers without doing them an injustice, since those "plucked" would go out when comparatively young, and would thus find it less difficult to adapt themselves to the work and to the conditions outside the navy.

(2) It would provide for placing the specially capable, brilliant, and efficient officers—those whose theoretical and practical abilities are unquestionably far above the average—at the top, where the navy would derive the most benefit from their services as leaders.

(3) It would have a stabilizing effect on the entire officer personnel, in that it would enable the average officer in every grade (and by *average*, I mean the 95 to 99 per cent of the officers in the

navy who go about their daily duties in a diligent, conscientious, and officer-like manner) to look with confidence to the future—something which he cannot do under the present system of promotion by selection, and which, in the opinion of the writer, is contributing a great deal to the prevailing unrest and dissatisfaction in the service.

(4) It would do away almost entirely with the principal defect in the present system of promotion by selection; namely, the practically impossible problem of determining the *relative* efficiency of officers by their fitness reports. It is not difficult to determine from an officer's record whether he should be selected *out* or not. It is a simple matter to find the defective apples in a basketful picked from the same tree. Likewise, it is not a difficult proposition to determine from their records and their service reputation, which one, or two, or three officers in a certain grade stand out conspicuously above the rest in ability, initiative, leadership, and general efficiency. But it is practically impossible to justly grade all the officers according to these qualities with the present available information. It is true, there may not be any officers in the list of eligibles who come up to this high standard. In this case, according to the proposed system, no one in that grade would be selected up. But if there should be any, then it would be the duty of the board to designate them for selection up, thus giving the navy the benefit of their special ability.

(5) This system of promotion would constantly stimulate effort and initiative on the part of every officer who has any pride and interest in the service, since those who are dilatory and those who fail to exhibit the characteristics of an officer and a gentleman, would soon find themselves "plucked" from the service. On the other hand, it would offer reward in the form of special promotion and position to those who show by their records and their service reputation that they deserve to be placed above others of less ability.

(6) Since only those who are considered by the Selection Board to be below the standard of efficiency and character would be selected out, the flow of promotion would be increased, under the proposed system, without doing injury to the service.

(7) It would practically prevent incompetent officers from reaching high rank. For example, after the operation of this system, for, say, 10 years or more, there would be very few officers

in the grade of rear admiral who had not previously been specially selected up to the grade of captain because of unusual ability.

(8) In the system proposed, there must be an *obvious reason* for selecting an officer for compulsory retirement. Likewise, there must be *obvious reasons* for "selection up." Furthermore, an officer's service reputation, necessarily, would have to be carefully considered in either case, before the Selection Board could properly make any recommendation. The writer believes that this would be a very important and a very desirable improvement over the present method of promotion, where it is not possible to consider the service reputation in the case of most officers in connection with their selection. The reason for this is, that there are such a *very* few officers whose service reputations are out of the ordinary—either good or bad. The "crackerjack," as well as the "hopeless failure," is always especially well known, and no fitness report, nor election, is required to determine who he is. It would be a very difficult matter for an officer to prevent his elimination, or to force his way to the top, by any other means than demonstrated ability. In other words, the proposed system of promotion in the navy is a positive one, while the present system is a more or less negative one.

DISCUSSION

COMMANDER P. W. FOOTE, U. S. Navy.—There are exactly and only three methods of promotion of officers:

First: By *Seniority*. Vacancies occurring only by death or retirement for maximum age or physical disability.

Second: Promotion by *Elimination* or *Selection Out* of certain officers whose efficiency is below a certain standard. Vacancies occur through death, age and physical disability, and a certain number may be mandatory by law, as was the case in the former selection out law, known as the "Plucking Board" system.

Third: *Selection Up*. It is contemplated in this system that the particularly efficient officers of the upper grades will be selected for promotion ahead of others on the list who are not so efficient. Vacancies occur through death, age and physical disability. This is the present system now in effect in the navy covering the promotion *from* ranks of lieutenant commander and upward.

In each one of these systems there are advantages and disadvantages. We have followed for certain lengths of time each one of the above-mentioned systems, and this experience has demonstrated that in each of these systems the disadvantages greatly offset the advantages obtained.

It appears that by adopting a system which would be a combination of the three systems we might obtain more satisfactory results than have been obtained by following any one of the three systems.

The above paper by Lieut. Commander Vossler, U. S. N., outlines a plan which is a combination of the methods followed in each one of the three systems. In this method a board of nine rear admirals would be appointed as is the custom at present and generally known as the Selection Board. This board would be directed to take under consideration the fitness reports of the officers in the grades of lieutenant commander, commander and captain, and would be directed to examine these reports and to recommend for retirement those officers in these grades who did not measure up to an established standard of efficiency. In other words, they would select out those officers whose records of service show them to be unfit for promotion, if such were found to exist. There would be no mandatory number required to be eliminated. The action taken would be governed entirely by the merits of each case. The board would also be directed to select for advancement to the top of the list of their respective grades, those officers whose records show them to be particularly efficient and outstanding in their performance of duty above others in their grades. These exceptional officers would be placed at the head of the list of their respective grades, lieutenant commander, commander and captain.

The officers on these lists, as re-arranged, would then be promoted by seniority to fill vacancies existing.

This Selection Board would be required to meet once or twice a year, as the circumstances might require.

The net results of this system would be that:

First: Those officers who have not measured up to the requirements would be eliminated. This elimination would thereby produce a certain number of vacancies and increase the flow of promotion.

Second: Those officers who are really particularly meritorious and outstanding in their efficiency would be given rapid advancement over officers of average or mediocre ability. This would finally result in having a certain number of officers in the admirals grade of exceptional ability and of desirable age from which the department could choose the officers for assignment to the positions of major responsibility in the navy, and this is one of the principal things primarily intended through the system of so-called selection.

Third: The officers of average ability would be insured of reasonable promotion and would not be constantly confronted with the danger of being retired from the active list through some unfortunate accident of their service. In other words, the average man would plug along with reasonable assurance of promotion, although at a slower rate than that of the exceptional officer.

Fourth: This method would not result in officers of good records being eliminated or selected out simply to create vacancies, as was the case in the selection out and "Plucking Board" system.

Fifth: The system would be flexible and would place promotion more exactly on the merits of each case than has existed in either one of the three systems which have been followed.

The present system of forcible retirement when reaching a certain maximum age in grade would be retained.

In order to allow each officer a certain control of his career and choice of action, voluntary retirement would be authorized for all officers who have performed ten years' service as a commissioned officer, the officers retiring voluntarily being allowed two and one-half per cent of their pay for each year of service as a commissioned officer. This would aid in increasing the flow of promotion, as those officers who would find that their chances of promotion were not good for some reason or other would be willing to retire if they could be assured of a small income which would enable them to go into civil life and start their careers all over again without having to face conditions which would otherwise seriously handicap them in the support of themselves and families during this transition period from the profession of a naval officer to that of a civilian.

The cost to the government of this provision would be comparatively small and would be well offset by the general resulting efficiency which would be accomplished. It is not likely that many officers would voluntarily retire with the minimum allowance of ten years' service, the average would probably be nearer that of 20 years' service. Therefore, this provision for officers would be in keeping with the present law which allows enlisted men to retire or to be placed in the fleet reserve list, which results in the same thing, after 16 years of service. This provision of voluntary retirement with a small rate of pay has been recently incorporated in the law controlling the reorganization of the army, as passed by the last Congress.

To further summarize the ends to be accomplished by the proposed system, would be as follows:

1 The really unfit officers would be eliminated.

2. The exceptional officer would be given rapid promotion.

3. Officers of average ability would be given slow, but sure promotion.

4. An officer not satisfied with his promotion could voluntarily get out.

In my opinion the general net results would be a very great increase in the general morale and contentment among the officers of the navy, as they would know that their future careers were either assured or at least they would have a choice as to their future which they could make without serious loss. This would, therefore, largely eliminate the "sore spots" now existing at the top of the grades of lieutenant commander, commander and captain, where a number of officers have been "passed over" for promotion a number of times, but under the present law are forced to remain in the naval service until they reach the age of retirement in their respective grades. These officers are naturally discontented and their complaints and grievances have a demoralizing effect among officers and personnel as a whole. Under the plan proposed, those officers who are not satisfied could get out, thus removing the complaint that they have no choice under the present system.

The merits of this proposed system will become particularly evident when the total number of officers, as allowed by law in all grades, have been obtained. When under any system of promotion the general flow of promotion necessarily becomes slower than has been the case in the past four years when promotion in all grades has been greatly accelerated by the great

increase in size of the navy, as authorized by the law of August 29, 1916, and succeeding laws. This is so because although the general flow of promotion will be materially decreased, yet a means will be readily available whereby the exceptional officers may be given rapid promotion and the government can have the body of officers at the top if the list of marked ability and of such an age as to be able to perform the duties of major responsibility with the highest degree of efficiency, and this result will be accomplished without having to pay too great a price in dissatisfaction and discontent among the general body of officers as a whole. In other words, it would come nearer producing a "square deal," both to the officer individually and to the government, than under either plan heretofore devised, or probably can possibly be accomplished under the conditions which necessarily exist in connection with the promotion of officers in the naval service.

COMMANDER W. C. BARKER, JR., U. S. Navy.—This scheme combines all three promotion systems, each of which has been tried in actual operation and each of which has failed in one or more particulars.

It is my belief that the seniority system adversely affects quite a percentage of our officers, namely those few of unquestioned superiority and that other larger class, comparatively small, however, of well-known inferiority. Probably 98 per cent of our officers after reaching the grade of lieutenant commander may be included in a class of hard-working, able and conscientious men, few of whom should be lost to the service. A system of seniority promotion which operates on this large class can result in no great harm to the service.

In order to incorporate the principles of "selection up" and "selection out," both of which are admirable theoretically, in that one frees the service of well-recognized incompetents and the other of which opens the door of opportunity and advancement to the exceptional officer, those systems should be included in the combined scheme but limited in scope.

This paper proposes such a scheme, and in general seems to solve the problem of promotion. The great objection to it lies in the inevitable "hump" which will result after the number of officers allowed by law is reached, after which the only vacancies that will occur will be those due to retirements, resignations, death and selections out, a total comparatively small. A number of graduates from the Naval Academy equal to the above total of vacancies would be taken in each year, the remainder of each class to be discharged.

It appears to me that one of two evils must be accepted in any promotion scheme, namely, either a "hump" or a transfer of a large number of useful officers to the retired list. Commander Vossler's scheme accepts the "hump" as the lesser of the two.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

WHAT IS THE MATTER WITH OUR NAVY'S RADIO?

By LIEUTENANT BOWDEN WASHINGTON, U. S. N. R. F. (Inactive)

The writer's naval service was partly ashore at navy yards and partly afloat attached to the commander-in-chief and to various force staffs for radio duty, and I have been at sea in practically every class of fighting ship, including airplanes and submarines. I therefore feel that I had a better than average chance to obtain an excellent "cross-section" of the radio situation, both as regards personnel and matériel. I became interested in amateur radio very early in the game, having what I believe to be one of the first amateur equipments in this country in 1903, and have been engaged in the practice of this art as an amateur and then as a professional ever since. I therefore cannot but feel that I have had the requisite training to make use of my opportunities for observation.

What is the matter with radio in the United States Navy? A great many officers will deny the implication, but I cannot but feel that these denials will not stand before the facts, and that they can be answered by the answer to one question: *Is our radio service absolutely reliable?* If anyone doubts that we have dropped behind our proper place in this art, he need only make comparison with the "W/T" service of the Royal Navy. A few such comparisons I will draw as we proceed.

First let us take up the engineering situation as it seems to-day, which is, of course, the kernel of the whole matter, for without adequate apparatus adequate results cannot be expected.

The engineering responsibility in this subject seems to fall between officers and civilians—largely on the latter perhaps, and for this reason let us first speak of them. The theory that civilian

experts should be employed undoubtedly has its sound points, but it is impossible to obtain really first class civilian experts at the salaries the Department is able to pay. In time of peace no man is going to serve the government for, say, $3600 a year, when he can easily command twice this sum outside. Several splendid men have been lost to the Department lately for this reason.

It does not seem to be thoroughly realized that there are not 20 first-class radio engineers in the country to-day—and that even good installing men are scarce. This is a very new art, with very limited personnel.

There is also the objection that most of these civilians have been at sea very little, and have little or no idea of the practical difficulties encountered; the vibration which the apparatus has to sustain when installed over the screws of a destroyer; the whipping of topmasts and shock of gunfire; the corrosive effect of salt water and funnel gases; and above all the seemingly inevitable mistreatment to which the apparatus is subjected. As an example, I have seen a radio compass coil in a more or less exposed position designed with 124 unsoldered connections, and iron washers used at that, connected to the most easily disturbed piece of apparatus extant—the audion. Would anyone having any experience with the corrosive effects of salt water perpetrate such a piece of designing?

There are a great many civilians in the Department who are capable, *if checked by an engineer,* of doing excellent designing, but who at present seem to have no one of real engineering ability over them, and are, therefore free to make unlimited small mistakes. I call to mind a certain piece of apparatus, mechanically well made, consisting of a single series circuit. Part of the conductor in this circuit consisted of a copper bar 1" x ⅛" while part of the circuit was of wire about the size of a pencil lead. It is obvious that this is about as sensible as running a 14-inch steam line 90 per cent of the way to the main engines and ending up with 1-inch gas pipe.

Another example of insufficient engineering supervision is the average navy yard "radio gang." The writer has spent a good many continuous 24- and 36-hour periods ripping out and reinstalling the main radio installation aboard various destroyers at

sea, not because the installation was poorly made but because the work was done in such a manner as to *render the apparatus inoperative.*

This sort of thing rarely happens with guns, engines, or ammunition hoists. Why should it happen with radio? Surely it must be admitted that we know enough about the art to install well-known types of apparatus properly.

The radio matériel officer at one of the larger yards remarked to me a few days ago that he had never received a wiring diagram that was perfectly correct—an undoubted exaggeration, but from my own experience containing too much truth to be funny.

Next the officers. We have a few officers—Naval Academy men—who have received a basic engineering training, and who have taken postgraduate courses in radio. These men have the right basis on which to build, but are they kept at radio? Rarely.

One of these officers who has the makings of an excellent radio physicist was "head of a department" afloat during part of the war ("gunnery" I believe); later a force radio officer, a largely executive job, and now holds a somewhat similar post ashore. Is not this a waste of good material?

We have some other officers who have come up from the ranks, some of whom have done splendid work, especially as their allotted tasks were often beyond their capabilities. These officers often lack the ability for sound basic reasoning that a knowledge of physics gives, and are therefore inclined to go about a research on the "try anything once" basis instead of first laying out a program based on constructive reasoning, and even if the solution is arrived at, the reason for this solution is often not. The chief petty officer, the electrician, the installer, is not in general an engineer or a physicist, and the only reason that I can see for this belief is that in the early days of radio, he knew as much as anyone, which was very little, and the halo has clung. One cannot imagine a civilian organization giving a good electrician or a good foreman, no matter how good, original research to accomplish.

As for the enlisted personnel, they seem frequently to have very little conception of the elements of the theory of their subject—and very little means at hand for learning it. I do not want or expect a chief electrician (radio) to express the theory of impulse excitation mathematically, but I do expect him to be able to tell

me in plain language the four reasons why a quenched gap quenches. There is too much "dope," if I may use this word to express incorrect theories, conclusions drawn from false reasoning or incomplete facts, etc. As an example—a chief tried a very small antenna for receiving a short and rarely used wave length. It naturally functioned better than the large antenna at *this particular wave length*. The next thing was a letter to the force commander from the ship's "radio officer" telling of this marvelous discovery of efficient reception on all waves and begging to recommend the adoption of this "device" by all the ships of the force.

Turning to the apparatus itself, we do not seem to always have adopted the best engineering principles. After all, what is engineering but getting maximum results under any given set of limiting conditions with the least expenditure?

We adopt types frequently after inadequate or inconclusive tests. I have seen a so-called comparison made between two transmitters—from different craft on different days, with different receiving apparatus and different operators. (The same sort of thing was done recently on some static prevention tests.) Anyone of these factors might make a 50 to 300 per cent difference. Would it be logical to test two types of service rifles: one from a machine rest, indoors, with hand loaded ammunition, the other "off hand" on a "puffy" day with service ammunition, and make a direct comparison, or for that matter, could any conclusion be drawn? When there are 20 dependent variables and one wishes to determine the relation between two of them, it is just as well to see that the remaining 18 remain fixed if one's conclusions are to be anything but worthless.

We have adopted a type of transmitter which is probably the most efficient of its class and by efficient I mean only that its output compares well with its input, but it has two great military disadvantages. It requires a rather high standard of ability among the enlisted personnel—and it "shock excites" any nearby antenna so as to make simultaneous operation of one or more stations on the same or nearby ships almost impossible. (I will say in passing that the type of apparatus I design and manufacture is if anything more of an offender under this last count—so it will be seen that I have no axe to grind. This, however, is not a disadvantage to merchant ships which do not sail in formation.)

The British use a strong rugged type of transmitter about half as efficient—but not open to either of these objections. Therefore they can work two or more independent stations on the same ship. Does not this seem better engineering? After all, if there are real advantages to be gained, why consider whether the radio set takes 10 instead of 5 kw. from the ship's source, which is probably from 50 to 600 kw.? This is probably partially the result of relying somewhat on civilian engineers outside the department who have no conception of naval problems.

Another interesting comparison is to be had in receiving apparatus. We build a single cabinet containing all the necessary gear. Very nice and very pretty when it is the latest thing out. Very inaccessible if there is trouble, with all the wiring neatly concealed. If one part—an inductance say—is found later to be capable of a 5 per cent or 10 per cent improvement, this cabinet set, costing perhaps $400, must either be scrapped, sent to a navy yard to be rebuilt, or be 5 per cent or 10 per cent behind current knowledge. If a part is destroyed, it is usually a machinist's job to replace it.

The British, on the other hand, build up a sort of panel of separate units. If a unit is improved, a new one can be placed in service in a few minutes. The same is true in case of a breakdown. The wiring is all in front, of heavy copper rod enameled in various colors for the various circuits. A glance can tell if there is wiring trouble, and if trouble in any circuit is presumed to exist that circuit can be followed by its color without the aid of a blue print, and each unit in the circuit tested and replaced where necessary.

This procedure also gives the operator a greater chance to become familiar with the circuits of his apparatus, for they are always in front of him. It may entail a slightly greater first cost and a little more work on installation, but it seems more than worth it.

The British enlisted radio men are trained to do what they are told and to do it correctly. They are not given a chance to do experimental work of their own nor to form incorrect theories. (The long enlistment may help in this.) Your plugman and trayman knows his job and does it. He does not worry about exterior ballistics. I doubt if it would help the turret crew much if he did, but he is given apparatus which works every time he asks it.

Among other things attained by this attitude among the enlisted personnel of carrying out existing orders rather than formulating their own, is that when a British operator is guarding (listening in on) say 600 meters, he is *on* 600 meters and will hear anything on that wave that occurs. This enables the British to largely dispense with all the calling and answering which we seem to find so indispensable, a saving in time and in interference.

If a ship is known to be within the range the message is sent and acknowledged—and that is all.

Another example is the use of only sufficient power to cover the distance easily—another obvious course toward minimizing interference. I have seen one of our ships "open up" on full power to a ship in the tail of the same column—enough power to be heard easily within a 400-mile circle.

Why this superiority? I firmly believe the reason to be a sufficiency of real experts; physicists and engineers.

What is the remedy for us? I see but one as long as we refuse to let line officers really specialize. The formation of an electrical or radio corps.

Our government, with its perpetual dread of becoming over-military, will never, I fear, allow the Department to pay high salaries to navy employees—but some men, I may almost say our best men—will accept inadequate pay if they receive with it the honor of belonging to a great service. Witness the number of naval officers to-day who could earn vastly more in civil life.

After all, we have a medical corps, and is electrical engineering any less of a specialty than medicine? Is it any less important to the service? Does it take a shorter time to master? Emphatically no. Is it fairer to expect a line officer to master strategy, tactics, gunnery, etc., *and* electrical engineering, than these same things plus civil engineering, or naval construction, or medicine?

As communications have a more direct bearing on the actual military operations of the fleet than civil engineering or medicine, I would suggest that this corps be formed largely of Naval Academy men who have seen several years of "watch and division" duty—have perhaps taken the War College correspondence course so that they may have a broad view of the bearing of communications on naval operations in general, who have been given a three-year course at Harvard or some like school and at graduation

transferred to this new corps. We already have a few officers of this sort as a nucleus.

I would also suggest that each fleet radio officer, when relieved, be attached to the War College as aid for communications. I heard not long ago that the war games were being played based on radio ranges of five years ago. A flag officer does not go to sea without his radio officer, therefore it would seem that a school for flag officers should also have its radio officer.

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MANUFACTURE OF FOURTEEN- AND SIXTEEN-INCH CUPRO-NICKEL ROTATING PROJECTILE BANDS BY CENTRIFUGAL CASTING MACHINE PROCESS

By Louis J. Josten

Fourteen- and sixteen-inch cupro-nickel rotating projectile bands are now being manufactured at the works of the George C. Clark Metal Products Company, Detroit, Michigan, for the United States Navy Department by the centrifugal casting machine process in a very successful and satisfactory manner. This process is patented by Mr. George C. Clark, president of the company, in the United States and foreign countries. The success of this process is due to the efforts of Mr. Clark, who carried on experiments for over two years before it was pronounced practical.

The making of cupro-nickel bands by the centrifugal casting process is novel in many respects, requiring keen judgment and practical knowledge. This knowledge must be gained by actual experience in the process. Details of minor importance in other lines of manufacture become items of major consideration in this process, therefore individual operations are done in a scientific way, all hit and miss methods being avoided.

The plant of the George C. Clark Metal Products Company consists of a one-story building 170 feet long by 50 feet wide, which is partitioned off so that 2200 square feet is allotted to the furnace room and the remainder for the casting and machining room. The small amount of floor space required is one of the principal advantages, other advantages being the superior quality of the castings over sand castings and the lower cost of production over forged, rolled, or extruded material.

The soundness of a casting produced by this process is far superior to one made in a sand mold, as there is no sand to wash

away during pouring, causing sand holes, or gases which cannot escape and causing blow holes. The centrifugal force acting upon the band during solidification has the same effect greatly intensified as a head placed upon a sand casting, which produces a gravity force. In this process it is practically impossible for porosity to occur, if proper care is exercised. If any dirt or impurities were given off during melting and should happen to get past the skimmer in the pouring operation, you would know in advance where to look for such impurities in the centrifugal cast band. The performance of the machine is like that of a cream separator, separating the light from the heavier elements, and as all of the impurities in the copper are lighter than the copper, they must assume the lesser radii. This actually happens and all of the impurities are to be found on the inside periphery of the band and are removed in the machining of the band. Numberless samples tested show that no such imperfections are present; on the contrary, all tests have shown the complete absence of such impurities.

Another feature worthy of mention is the cleanliness of all departments of the plant. There is no foundry sand or dust, no sandy castings to knock off the edges of the machining tools, and no sandy turnings to remelt.

On the outside of the plant is an underground reservoir, which holds 20,000 gallons of oil for use in the furnaces. A railroad siding is also provided for the loading of bands for shipment.

MELTING

Fig. 1 shows a view of the furnace room installed with three Hawley Down Draft Furnaces of 3000 pounds capacity each. The air is furnished by three P. H. and F. M. Roots Company rotary pressure blowers, size No. 2. Ordinary methods of melting are all that are necessary to melt the mixture which is composed of 97½ to 98 per cent copper and 2 to 2½ per cent nickel. Nothing but high grade ingot copper and the turnings from the bands are allowed as the specifications call for ingot copper of not less than 99 $\frac{8}{16}$ per cent purity. The nickel used is of the best and purest grade obtainable. The tapping temperature is about 2300° Fahrenheit, so as to allow for a casting temperature of 2150°. The correct pitch of the metal is tested from time to time before

the metal is tapped by means of buttons. Care must be exercised to see that the oil that is used in the furnaces is of a proper analysis, as to its sulphur content.

Handling of the metal is one of the most important features connected with this process. Positive methods must be employed that will permit the band to be cast at the most desirable temperature. This is a very important point, for if the casting temperature is not correct, the physical tests will fail, rejecting the entire heat. It therefore becomes important that the casting room have a sufficient number of machines in operation to permit of the removal of the metal from the furnace in the shortest time possible, after it has been brought up to the proper pitch and temperature.

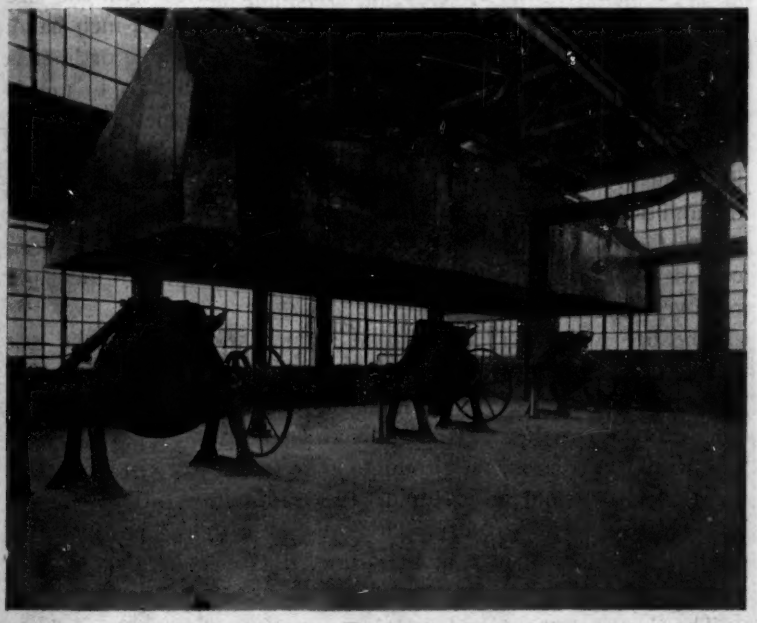

FIG. 1.

The three furnaces are melting about 20,000 pounds a day. The ladle receiving the metal from the furnace is of a capacity sufficient to pour three bands. It is hauled to the casting room by means of an overhead trolley system. Extra precaution is taken that the metal does not oxidise on its way to the casting room.

DETAILS OF THE CENTRIFUGAL CASTING MACHINE

CONSTRUCTION

Fig. 2 shows one row of casting machines, there being two rows of three machines each. The principal parts of the machine are the die and die holder, the movable spout and the metal pouring attachment. The die and holder are driven by a shaft, to which is attached a foot lever brake controlling the speed of the die and holder. The speed of the machine varies with the size of the die used, being about 1050 r. p. m. for the 14-inch band. The holder is made of plain carbon steel, while the die or liner is a forging, with a special heat treatment and held in place by means of six set screws. A hinged cover plate of the same diameter as the holder and having an opening large enough to accommodate the pouring spout, is made to open and close on one side of the die and holder. This cover plate prevents the metal from running out of the die during casting. After the band is cast and has been cooled sufficiently, this cover plate is unscrewed and the band removed from the machine.

The life of a liner is such that about 250 bands can be cast before it is burned out and has to be replaced.

All revolving parts are made in absolute balance. This is most important, for if they were not, one can readily see what influence this would have upon the product. The two masses in high rotative velocity would be assuming two radii of gyration, causing the mass of metal to change its relation with the periphery of the liner while still in a molten state, thus causing uncontrolled contractions in the castings.

The pouring spout and metal pouring attachment is made to move upon a V-slide. The position of this spout is most important and should be such that it delivers the metal to the periphery of the liner without excessive splashing. This spout is not permanently attached, but is made to raise and lower for the purpose of movement in or out of the die. The spout is supported near the pouring lip by a rod. Trunnion bearings made of strip steel and placed in line with the spout are constructed on each machine to accommodate the tilting of the pouring ladle.

Each machine is equipped with an air hose to clean off all particles that may adhere to the die and cover plate after casting. A water pipe is constructed on each machine so that the pipe may

be adjusted by hand to supply water to the die during casting for annealing purposes or bent back out of the way when the machine is not in operation. A drain pipe carries the water away from each machine. A sheet iron shield covers the die and holder to prevent excessive splashing of water or metal.

CASTING

In preparing the machine for casting, the cover plate on the side of the die and holder is unscrewed and let down. The air

FIG. 2.

hose is used then to remove any foreign substance that may adhere to the die or inside of the cover plate. The die and the inside face of the cover plate are coated with plumbago and after the cover plate is screwed in place, powdered talc is sifted very lightly on the inside of the die to keep the metal from sticking to the same. The pouring spout is also coated with plumbago. The machine is now made to revolve and the spout is moved forward so as to deliver the metal to the die. The metal is brought from the furnace room in a ladle of three times the capacity of the small crucible shown

on the machine in Fig. 2. The amount of metal poured into the small crucible on the machine is sufficient, as shown by experiments, to allow the band to be cleaned up in machining. The metal is now ready to pour. This is done by tilting the small crucible on the machine so that the metal will flow through the spout into the die. While the machine is still in motion, the spout and crucible which move upon a V-slide are pulled back out of the way. When the band shows the desired color for

FIG. 3.

annealing, a stream of water is turned on the band through a pipe. This pipe is adjustable by hand so as to place it in the correct position. This feature saves considerable time and expense as the band is annealed by its own casting heat. After the band has sufficiently solidified and has received its proper annealing, the water pipe is taken back out of the way so the cover plate can be unscrewed and let down to allow the band being removed from the die. The band is then weighed to see that there is sufficient metal to allow for the band cleaning up. The casting date is

stamped upon each band, for instance 7-2-3, which denotes that it is the third heat of July 2. The date of casting and heat number are put on each band so if this heat fails either as to chemical analysis or physical tests as required by the specifications, it can be identified and rejected. After the band is cast, it is necessary to keep the lip of the pouring spout clean, as a certain amount of metal clings to its sides and has to be removed by hand with a chisel.

FIG. 4.

MACHINING

Fig. 3 shows two Bullards in operation, one for machining the inside of the bands; the other, the outside of the bands. There are only three machines necessary to completely machine the bands, namely, two Bullard vertical turret lathes and an ordinary engine lathe. The first operation in the machining of the band is done by placing the band in the engine lathe to remove the large fin which forms on the inside of the band during casting shown in the rough band in the right foreground of Fig. 4. The

second operation is set up on the first Bullard for machining the inside of the band and the top face of the band. The fixture made to hold the band for this operation consists of three steel castings which are individually screwed down to the chuck of the machine so as to move universally when tightening or loosening one of the chuck screws. The band now moves on to the second Bullard, which is set up for machining the outside diameter and the reverse face of band. On this set-up, the band is held in place by an expansion toggle joint chuck made in three parts. The sharp edges of the band are rounded off. The band, now being completely machined, is moved on to the inspection bench to inspect for surface defects and check up for gauge dimensions. The tolerances allowed by the government in machining are very liberal, being twenty-five to thirty thousandths in most cases. A small auxiliary machine shop is operated in one corner of the building for machining the dies, holders and tests.

TESTING AND INSPECTION

Two physical tests are required to pass a heat of bands, one being taken from the beginning of the heat; the other, at the end of the heat. The test pieces are machined to a size designated in the specifications, namely, 1½ inches wide by ⅜ inch thick. The elongation is taken over a 3-inch length. The physical requirements are as follows: Tensile strength 30,000 pounds, minimum; elongation, 30 per cent, minimum; reduction of area, 35 per cent, minimum. In the selection of test pieces, this process is at a disadvantage over other methods as there is no way of obtaining test pieces without destroying a good machined band, as each test selected has to go through the same process of manufacture and heat treatment as the bands that it represents in the lot. The band from which a test piece is to be cut out is first taken to an arbor press and flattened down to an opening of about five inches. Then a piece of sufficient length for a test piece is cut out from the flattened side in a high speed cut off machine. The tests are then finished to the correct size and shape in a shaper. The remarkable ductility of rotating bands made by the Clark process is greatly in favor of this method of manufacture, a large number of tests for elongation and reduction of area having averaged over 45 per cent above the navy requirements. A chemical analysis is required from each heat also.

Occasionally, the manufacturer makes special tests, not required by the government, for his own benefit or information. Several bands have been taken and flattened out upon the inside periphery of the band without showing any signs of fracture at the edges; others have been bent back on the outside periphery of the band with closely the same excellent results.

The inspection of the bands consist of an inspection for all surface defects and the gauging of all the machined surfaces with gauges of a "go" and "no go" tolerances. When a sufficient number of bands have passed inspection, including the physical and chemical requirements, they are loaded and shipped to destination. Each band is marked with a government stamp to show that they are accepted.

This process on account of the rapid production possible with the centrifugal machine and the fact that unskilled labor only is required for its operation, has solved what was heretofore a serious handicap in the country's production of large projectiles—viz., the manfacture, in great volume, of rotating bands in the large diameters—and is capable of quick extension of production facilities if necessity should arise.

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THE COMMANDING OFFICER, RECRUITING OFFICER, AND MEDICAL OFFICER *VERSUS* DESERTION

By CAPTAIN J. S. TAYLOR (M. C.), U. S. Navy

THE COMMANDING OFFICER AND DESERTION

It may seem presumptuous for a medical officer to venture suggestions on such a topic, even though himself subject like every other component part of the naval personnel to discipline and under solemn obligation to promote it by every legitimate means. This paper was originally prepared at the suggestion of an officer of the line of the navy and the statistics are derived from an able presentation of his study of desertion submitted by Lieutenant R. E. Parsons, Medical Corps, U. S. Navy, to the Sixth Division of the Bureau of Navigation. Having been for 22 years a member of the naval service, a deeply interested observer of its growth and development and a constant student of human nature the following remarks are offered not in a spirit of hostile criticism but as perhaps possessing some value because, coming from "a looker-on in Vienna," they represent a different angle of vision.

In every branch of human activity there are certain guiding principles, certain moral and philosophical considerations underlying conduct. The successful administrator must fully understand these latent but compelling forces. The administration of discipline and the control of military organizations cannot be highly effective if it is done in a mechanical way; if justice is to be dispensed there must be full appreciation of the reason for as well as a knowledge of the provisions of the law.

The Articles of War and Navy Regulations, indeed the whole structure of discipline and military life are built on a profound knowledge of human nature. For example the force of habit, the instinct of self-preservation, gregarious tendencies, the spirit of emulation, all of which are exhibited in varying degree by animals

as well as man, are utilized in training the units to be combined into an effective fighting force. Daily repetition of certain complex and difficult movements makes them easy; regular experience of alarming or dangerous situations robs them of their terror; rewards, promotion, honorable mention, medals and ribbons, distinctions in rank, insignia and uniforms, the change from dirge to quick march when the funeral is over have their justification in man's ambition, his inborn inclination to hero worship, his deep-seated respect for power and authority and the necessity of playing the game in spite of sorrow and calamity. The recruit is subjected to sights and sounds, surrounded by an atmosphere, initiated into a mode of life calculated from a knowledge of human nature to mold him to a desired type and the rules of military service embody in practical form the sum of observation and experience along these lines.

The cardinal error of many persons vested with military authority consists in losing sight of these basal facts. They accept the stereotyped regulations of the body to which they belong not as an epitome but as an encyclopedia. For them the regulations represent the first and last word, the embodiment of all duty and responsibility and a complete guide to conduct. Such men are not apt to be successful disciplinarians in the best sense. With them there is little chance for progress and development either of the individuals under them or of the organization as a whole. They follow the letter of the law to the neglect of its spirit and intent; they carry out the regulations but ignore the human nature on which the regulations are founded.

The majority of military commanders fall into one of two great groups; the mechanical and the spiritual. The mechanical disciplinarian is always within the letter of the law. He has, of course, never knowingly "incited a man to desert" and would be highly incensed at the suggestion of such a thing. His conduct is technically unimpeachable; no flaw can be found in his knowledge and interpretation of the regulations and no court could ever incriminate him. His officers and men comply outwardly with every law and requirement but the former are dissatisfied and the latter desert. His iron inflexibility, his excessive zeal for order, his attention to detail destroy individuality, smother ambition, benumb effort in his subordinates and divert him from functions of a higher order which are the peculiar field of the officer of com-

mand rank. One of these is to reason out the moral factors bearing on military life. Without realizing it he is himself a disintegrating factor in a body which needs above all else to be unified, consolidated and cemented together. Himself upright, he is nevertheless a stone of stumbling and a rock of offense to others. He passes with skirts unsoiled from promotion to promotion but leaves behind him a trail of wrecked lives and unhappy ships. Living according to the letter of the law and exacting its minute observance by his subordinates, his conscience acquits him of wrong, but he may have sinned daily and hourly by all that he has left undone in domains where the law could not condemn him because these fields of action are beyond its exactions: he treats men as machines, yet demands of them the fruits of the spirit—patriotism, self-sacrifice, courage, devotion to duty.

The spiritual group includes men who at any given moment of their careers could perhaps be proved guilty of some minor infraction of regulations but who lead happy and useful careers and have happy ships and efficient crews. With them regulations and instructions are not like mathematical theorems or the laws of chemical combination. They recognize that while chlorine and sodium in certain definite proportions always combine to give a definite weight of common salt no such formula for conduct is applicable to men. The "human element" is ever uppermost in their minds. Not the law's observance but the accomplishment of the law's ultimate purpose is their guiding principle. They require all men to be in uniform but do not allow themselves to forget for a moment that identity of externals does not assimilate individuals or obliterate marked variations of personality. The culprits brought before them in the administration of justice are not viewed by them as mere cogs in a wheel but as plastic material that must be so handled as to be welded into conformity with the most comprehensive aims and purposes of the ship and the service.

The commanding officer, who administers his ship through trusted and competent heads of departments, has under his direct observation his officers, his orderlies and the quartermasters and helmsmen, but at drills and maneuvers and in the ordinary day's work the bulk of the crew are merely groups of men seen *en masse*. It is mainly when infractions of discipline occur that the captain of a ship comes into contact with his men as individuals and the

administration of justice on such occasions is at once the most difficult and the most important of his many and onerous duties. It is one which cannot be performed in arbitrary and perfunctory manner because, though the law may be satisfied, failure to consider both the spirit of the law and the spirit of the offender will produce the most widespread and disastrous effect on the entire personnel.

Offenders are either occasional or habitual. Young and inexperienced must be the officer who fails to distinguish between them. Rare indeed is it to find a captain who would not assign a different punishment for the first offence and the fifth. To waive punishment altogether for a first offence is often the part of wisdom if a consideration of the culprit and the attendant circumstances seems to put the offender into the occasional, the offence into what might be termed the accidental class. These well-established distinctions are important and referred to here because they illustrate a discriminative, selective action which should go further than it does and be far more general than it is. There should be a distinction, too, between the violator of regulations and the offender against the fundamental laws of society. The man who steals a watch commits the crime of theft and at the same time is guilty of a deed peculiarly opprobrious because of the conditions under which men live aboard ship. The man who thoughtlessly violates the sanctity of the quarterdeck or the tenets of the sea, as by whistling, is in another class. Yet on at least one occasion these two offenses were punished in an identical manner with disastrous results to the morale of the ship. The minor culprit conceived that he had been punished as severely as the common thief who preceded him at the mast. He went away with a grievance. The rankling sense of injustice made him a potential deserter and did the same for the man who had been robbed. As a matter of fact the captain gave the whistler or loafer a legitimate but maximum punishment. In the case of the thief there was no doubt of the guilt but there was lack of proof and the error of judgment lay in assigning a trivial punishment rather than none at all for a major offense when the two incidents were so conspicuously juxtaposed. The interpretation put on the captain's action was a false one. The crew decided that he deemed whistling on the quarterdeck over his head an offense of equal magnitude with the theft of a poor enlisted man's watch. This was doing the captain a great

injustice but he would have been wiser, as well as in keeping with strict judicial procedure, to let the thief go unpunished in view of the lack of proof. The occasion might with propriety have been marked by a thoughtful comment on the heinousness of theft aboard ship and the reason why the suspect did not receive punishment and what an adequate one would be.

In a general way our enlisted men appreciate justice and accept without a murmur the proper legal punishment of their misconduct but let there be with the award a conspicuous manifestation of other than judicial bearing and deep discontent with incalculable consequences follow. Discontent cannot always be prevented. There are men who are never satisfied and the more they receive the less they give. To coddle and pamper men with the idea that they will be happy and so do good work is the most fatal of errors. The happiness which promotes production is that which flows from tranquillity of spirit and complete harmony with associates; from fitting into the position assigned. To make a pet and a favorite of a man spoils him and tends to general disorganization—because it is bound to destroy harmony between him and his fellow workers who envy him though they may not themselves desire to be petted.

The lowest of men recognizes in a dim way that he has a something called soul; he must be very far along the road to perdition before he loses all sense of what is due him as a mere man, before he will endure certain indignities intolerable to a human being regardless of his calling, his rank or his status before the law. That is why flogging was such a failure as a disciplinary measure. Men bore the pain without flinching but their souls were wounded beyond recovery and the cat-o'-nine-tails bred hatred, rebellion, mutiny in those who endured it and in any man of spirit who witnessed the ordeal.

As the type of man coming into the navy has become steadily better and higher so it has become necessary to dispense with every form of punishment for mere infractions of discipline which was in any sense degrading, and the fine and reduction in rating with consequent loss of pay have largely superseded the brig which to the sensitive soul was like a cage for an animal. The reader who recalls some of the rough characters that have passed in review before him in the navy may smile at the expression "sensitive soul" but it is the sensitive being from whom may be expected

the sublime deed of valor and heroism, the self-sacrifice, the unswerving loyalty, the unreasoning daring that crowns our flag with glory and makes the navy the true school of citizenship. We must preserve, modify and utilize men's sensibilities, not obtund and stultify them. Quick reactions in emergency are not to be expected from the callous; those whose feelings have been dulled and perverted by a lack of discernment in the controlling power are the men who desert without a blush or put self before duty in moments of grave peril. Irons single or double have been wholly discarded. To humiliate a man by creating in him a sense of the seriousness of his offense is legitimate: to humiliate him by a degrading *form* of punishment is to crush out his spirit and ruin him and some of his associates forever. We want men of spirit not galley slaves in the navy and the best captain is he who knows how to develop capacity, enterprise and daring; whose punishments awaken and quicken instead of deadening the human spirit. The hectoring, bullying, swaggering, choleric captain may survive in fiction but there is no place for him on an American quarterdeck. Even the commanding officer who indulges in biting sarcasm, who withers the culprit with his contempt and makes him cower before a haughty, heartless demeanor is guilty of a serious error for such conduct begets bitterness. Often it is not the law's sentence but the semblance of a sneer accompanying the verdict that leads to desertion.

A certain captain returned one night to his ship and was horrified to find a member of the crew sunk in a drunken slumber on his erstwhile inviting brass bed in a cabin that he had left immaculate but was now filthy and disgusting. The captain was naturally indignant and what passed between him and the sentry is not known but his handling of the situation was remarkable. Needless to say that by "turn-to" in the morning the incident was known all over the ship and everybody was on the tip-toe of expectation about the fate of the unfortunate man who under the influence of liquor had violated and defiled the sanctity of the captain's cabin. At the proper time the offender was brought to the mast, sentenced to five days in the brig for returning to the ship intoxicated and dismissed with a simple but emphatic reminder that liquor often leads a man to make a fool of himself. There was not a reference to the invasion of the cabin, no hint of *lèse majesté*.

The effect of this impersonal treatment of the affair was enormous. The man remained on the ship two years and never again took a drop of liquor in that time. The captain had reformed him and he acknowledged the fact gratefully. As for the crew they were more than ever the loyal and devoted admirers of their commanding officer whose methods were novel but effective and well illustrated by the incident cited. There were many irregular things on his ship but they were constructive and not destructive. He wanted his officers and men to be efficient; was not satisfied with the routine performance of duty, with the minimum that could be regarded as satisfying the regulations; exacted all that the regulations were designed to secure. His ship was a happy one and a smart one too.

It would be unpardonable to intimate that a commanding officer is ever intentionally partial but it is true that conditions often prevail on a ship that, to the enlisted men, suggest partiality and the practical administration of affairs sometimes lends considerable color to the suggestion. This breeds the kind of discontent that makes for desertion. The better the man the more intensely he resents anything that savors of injustice and once the idea that he is victimized in favor of another takes root in his mind he becomes a potential deserter whom the merest trifle may convert into an actual one. Yeomen, cabin and ward room stewards, the men who come into most frequent and direct contact with officers so that they are better known and have their good qualities more highly appreciated are very apt to receive special privileges. This may be right enough in one way but it is a policy of doubtful wisdom.

In general there is no greater promoter of sound sleep than the tonic of work. This is universally recognized and to keep the men busy is generally accepted as the best recipe for contentment but there is such a thing as overdoing this. Unless the idea is carried out with tact and judgment it may be productive of harm. There is usually enough to do on a ship or at a station to keep all hands reasonably busy if inspections of compartments, magazines, storerooms and living spaces, etc., are rigid and a high standard of cleanliness is insisted on. Men are very quick to discover it when work is simply manufactured for them after the regular requirements have been met and they deeply resent such a policy. If

the upkeep of a ship or station and the training of the crew do not absorb all the time available what remains should be assigned to legitimate recreation planned and supervised not so openly but with as much care and forethought as is expended on any feature of duty. The point is to have men occupied. It is idleness, not leisure, that does harm and the spare hours devoted to athletics, dramatic performances, games, etc., are fully as useful in promoting a proper frame of mind as work and infinitely more salutary than an excess of work which appears unnecessary to the crew and often is unnecessary and irksome. The ship that coals on Sunday when other ships are sending hundreds of men ashore for liberty, while every one on board knows it is not imperative (a knowledge confirmed by a delay in sailing until Wednesday); the ship on which an enthusiastic but overzealous and indiscreet gunnery officer prolongs the drills and repeats general quarters again and again in a single day through week after week of preparation for target practice, pursuing a policy that no physical trainer would employ for man or beast; the ship on which the men have no regular definite time which they can call their own; on which their plans for relaxation and amusement are arbitrarily and summarily interfered with in times of peace without a vital and urgent necessity will not be a happy ship but one whose complement is never full.

There is no plea here for the relaxation of discipline, for condoning neglect of duty, disobedience or insubordination, but merely that the idea of discipline must be enlarged. The discipline of the modern navy includes improvement and development of mind and heart and body to mold the whole man to the purposes of the navy and the will of authority. Swimming is obligatory; so is setting up drill. Every ship has its library. A chaplain is one element of the officer personnel; so is the fleet or ship athletic officer. The high discipline is that which utilizes every measure to bring out the good in men and fend off possibilities of wrong doing. It involves forethought and constant study on broad lines.

It may as well be recognized that the era of "driving" has past; that unless the navy offers a livable and attractive program and fulfills it—one in which hard work and healthy play are properly balanced in the day's schedule—we will not get the men or, getting them, will not be able to hold them. We may punish all we please

but punishment remains largely a negative measure, an aftermath of evil with scant reforming power.

Less than a quarter of a century ago there was open mutiny on a certain vessel of the navy followed by the inevitable courts-martial which awarded sentences of penal servitude for periods reaching as high as seven years. The culprits were guilty and the punishments in accord with justice and law and yet the mutiny was preventable. Two main causes were responsible for the outbreak. The crew was composed in the main of faithful, hard-working men who had experienced peculiar conditions and always responded in an exemplary manner to unusual but legitimate demands. When a period of rest came they objected to doing work which they regarded as imposed merely to keep them busy. Nothing would have come of this feeling, mainly one of humiliation, had not a draft of recruits come to the ship about this time. The new accessions had no conception of military requirements, having never been properly indoctrinated, and conceived that their situation was not different from that of the workmen in civil life who may organize, protest and refuse any employment not to their liking. The influence of this new leaven was not perceived and the inevitable happened. Had the circumstances been different wholesale desertions would have manifested the general discontent which actually took the form of open insubordination. A good rider knows better than to come to an open contest of strength with his steed and circumvents instead of trying to overpower him. The temper of the men and the ignorance of the more active fomenters of disorder among them on the ship referred to should have been perceived and their outlawry forestalled.

Many a good man deserts in a state of temporary discouragement or discontent who would not do so if he had a full sense of the gravity of the offense. This is particularly true in the case of young recruits. Not to warn them is a serious error on the part of the officer responsible for their conduct and training. The first solemn caution should be given at the recruiting office and the enlistment papers might well contain a statement over the recruiting officer's signature that he had fully explained the nature of this act. At training stations and on ships the same instruction should be given and periodically the captain himself should briefly carry home the lesson by a few judicious words.

Major General David C. Shanks (National Army) U. S. A. considers this matter to be of the greatest importance in combating desertion. He says:

> In large part desertion will cease as soon as the soldier knows that he has thereby committed a crime which makes him despicable to his comrades in civil life. While I am sure that desertions in our army are largely the result of the fact that the seriousness of the crime is not appreciated by our civilian population, I am confident that the number of desertions in our army would be greatly lessened by proper effort on the part of our officers. Too many of our officers apparently go on the supposition that the only way to check desertion is by punishment after the crime has been committed and the soldier is again within military control. *They never do anything to prevent the crime from taking place.* I state it as a fact, which I believe could be established without difficulty, that a very large proportion of our men who desert leave the colors and break their oath without even having heard a single officer raise his voice to caution them against this crime. Many of our officers when asked about desertion merely state that a certain number of men have deserted and then on their part ask, "What are you going to do about it?" If any officer is satisfied to have men desert from his company without his ever having taken any steps whatever to prevent it, he has failed in his duty and he has not done what the government has a right to expect. The officer has a certain duty which he owes to himself and to his government and if he shirks it, the blame, in part, at least, can be placed upon his shoulders.
>
> Every recruit who joins a company ought to be talked to on this subject; he ought to be instructed thoroughly by his officer as to the difference that exists between a mere civil contract and an oath of enlistment. He should understand the difference between a man who makes a bargain in civil life and then changes his mind, and the man who raises his hand and takes a solemn oath to serve his country and follow the flag, and then breaks that oath. It is up to the officer to explain this difference to the young soldier, not by long sermons, but by such brief talks to his men as will put into the company a spirit of detestation for that man who engages to serve his country and then violates his oath.

This surely applies no less to sailors than to soldiers and no less to naval officers than army officers. If commanding officers of all training units were to vigorously put into practice the recommendations of General Shanks, there would, without doubt, be a measurable decrease in the deserter roll.

One of the most difficult features of ship and station administration arises in connection with the granting of special liberty privileges to men who ask to go home on account of sickness or death in the family. Every commanding officer knows that the grounds for a goodly per cent of these requests are fabricated

and this tends to make the decision a perfunctory matter, one determined by reference to a schedule showing whether the petitioner has any furlough due him or not. The man who has offered a trumped-up story and been refused will slouch away and talk large of injustice but his shipmates usually know he has been lying and the general tendency will be to admire the officer who saw through the ruse. Where the case was a *bona fide* one the results are different and very serious. An officer must put himself in the man's place so far as he can and try to realize what it means to be tied hand and foot by military restrictions, or to be refused in an apparently indifferent, mechanical, offhand manner when the loved wife, mother or sister is sick or dying at home. He should consider the independence of conduct and movement the man enjoyed before he voluntarily placed himself under the powerful restraints of military life and realize that if the request is a proper one the chances are that the man will say to himself when refused: "I did not have to come into the outfit and I do not have to stay in it." Family ties are the strongest a bluejacket has. He will incur the gravest risks for their sake. Many an excellent man deserts when refused the furlough he sought because there is trouble at home. A thousand cases of desertion at the Portsmouth naval prison were recently analyzed by Lieutenant R. E. Parsons, Medical Corps, U. S. Navy, and showed that more than 22 per cent (228) were due to the call of sickness or death in the home, drink accounting for 38 per cent and "no reason," "wanting liberty," desire "for a good time" combined amounting to 36 per cent. Very few men but will take the law into their own hands and feel they did right in "jumping ship" in obedience to the wish of a dying mother to see her son once more.

This question of unusual furlough privilege is therefore clearly one of immense importance to the man and to the service and each case should be investigated with the most painstaking care and it would seem better to have a good many men get unmerited furlough than to deny a single meritorious appeal. Some uniform system of verifying the facts might be devised and employed as a routine measure. For example, on returning from furlough, a man might be required to produce a set of papers and vouchers stipulated in advance and failure to do so could be punished by a heavy fine not ostensibly viewing the omission as an evidence of fraud but of carelessness and neglect of the ship's regulation re-

quirements. Cases of fraud and misrepresentation can often be detected and should be punished with great severity.

The group of a thousand deserters above referred to contained 120, or 12 per cent, where failure to return was due to fear of the consequences because the man went without leave or overstayed it. Steps should be taken to explain thoroughly to every man going on leave, particularly recruits, the vast difference between "overtime" or "jumping ship" and desertion. Of course it is not practical to preach a sermon on rectitude to every man going on liberty but it is worth while to take a good deal of trouble in this matter for it saves more trouble later on. It might be delegated to the chaplain to bring out these points periodically in a sermon. A captain assuming command might advert to the subject and every man going over the side might be given a small printed slip summarizing the points about desertion, etc., until all the crew had had one liberty and thereafter every new man reporting aboard could be given such a slip at least once. Better measures than these can be devised. They are offered merely as a suggestion.

On every ship and at every station the greater part of the offenses committed can be brought home to a relatively small group of men who appear again and again at mast and are often habitual attendants at sick call. By reason of mental, moral or physical abnormalities they are wholly incapable of adapting themselves to conditions of military life and hence constitute the ship's delinquent class.

Under the most favorable conditions in civil life the shortcomings and peculiarities of such men do not attract much attention but they fail to measure up to the standards of a highly specialized life like that in the navy with its prescribed routine. Those who cannot conform to the general pattern and are constantly running foul of some provision that their biased intelligence will not accept are best disposed of at once by survey or inaptitude and bad conduct discharge in the same manner as the chronic invalid or the victim of patent and active insanity. As a matter of fact a certain proportion of all court-martial cases, and a very large percentage of men tried for desertion, have a mental defect of some kind. Thus, in the group of a thousand men serving sentences for desertion referred to above, fully 50 per cent belonged in the class of feeble-minded or showed constitutional inferiority,

constitutional psychopathic state, dementia præcox, a neurosis of some kind, paresis, chorea, neurasthenia and allied affections.

It would certainly seem the part of wisdom to require a medical officer to be present at mast, especially at training stations, so that he may study the bearing and face of each offender, hear the often remarkable excuses offered in palliation of an offense and perhaps discover later by careful study any cases of mental defect among the habitual offenders. Moreover it should be the established rule for drill officers to refer to the medical officer for study such recruits as prove hopelessly dull at their tasks, incorrigible, insolent, peculiar, the objects of general ridicule or unfavorable comment from their shipmates.

A captain should be supreme on his ship but some commanding officers wrapped around in a mantle of satisfaction at the punctilious way in which their orders are executed fail to make the subtle distinction between obedience to their orders and the fulfillment of their wishes. The captain's essential wish of course, is to have an efficient ship, one marked by smartness at drill, swift and correct maneuvers, an active, well-behaved crew, redounding to his prestige; but though his word is law he does not always succeed in getting his heart's desire. There is no way to make men reenlist against their will and on certain ships they cannot be prevented from deserting. Failure to reenlist and desertion are the enlisted man's reaction under defective discipline. The discipline may be administered in a spirit of intolerance, be characterized by high-handed methods and an excess of militarism or the reverse of all this, but unless there is in the cabin a profound appreciation of the human element, and if the ship is run without a complete understanding of the enlisted man's attitude to life and to the service, without a carefully developed policy based on a broad consideration of the times in which we live and of all the conditions that prevail, the desired results of navy training will not be obtained. Officers embarked for life in a military career are prone to forget that a certain stratum of society is made up of men who constantly shift from one occupation to another; from the automobile business to real estate, from that to life insurance, to selling goods and to an infinity of other pursuits. The enlisted man is similarly unstable, especially during a first or even second enlistment. He has no commission, no social and personal interests to hold him in the service, he has not chosen it as a career but

entered it as an experiment and is easily diverted from an employment fraught with discomforts and privations and offering no glittering reward in the future. Necessary discomforts and privations he cheerfully endures but let the carelessness or callousness of a superior impose too much and the cord that holds him is easily snapped.

The loyalty which enlisted men display when their officers are in trouble or need is proverbial. They do not hesitate in times of stress or deadly peril to risk their lives even for an officer who is personally unpopular. This is accounted for by the fact that, grafted upon the best instincts of human nature, there are feelings of obligation to the shipmate, the partner in the vicissitudes of the sea, the leader. This loyalty and devotion calls for a corresponding recognition on the officer's part of the ties that bind together those who wear the uniform of the navy. This appreciation of common interests and a common lot, as well as of a common humanity, should manifest itself not by a relaxation of strict discipline on the part of the commanding officer and his associates in authority but rather by concerted measures to render the enlisted man's life as healthy, as happy, as natural as possible under the abnormal conditions that attend seagoing, abnormalities that fall most heavily on the young and untried recruits who are also those most likely to desert.

Perhaps the most important single asset that a commanding officer can possess for wisely conducting the internal administration of his ship is such a lively imagination that he can appreciate the feelings of others when petty disappointments and humiliations occur, for when these are reiterated they cause more desertions than some great thing.

Contrary to what many suppose it is not always the officer who was once an enlisted man himself that makes the considerate commander. Too often such an one has forgotten how he used to feel or else he belongs to that class of men who conceive that as things have been so they must always be. Unless he has the qualities specified by Taine in his immortal definition—"the most perfect gentleman is he whose intelligence is most cultivated, whose heart is most devoid of selfishness"—the ex-enlisted man's rule will be less tolerable than that of the officer of very different antecedents possessed of delicate sensibilities, capable of broad concepts, surveying life on a broad horizon.

THE RECRUITING OFFICER AND DESERTION

It is legitimate, it is highly desirable, for the officer in charge of a recruiting station to wish to secure as many men as possible but he should realize from the start that for "the good of the service," which is the true life purpose of every officer, numbers count less than quality. We want good men and men with physical defects are not good for military purposes generally speaking. It is undeniable that in battle, in the ardor of attack, many a man with serious blemishes both physical and moral may make good, but there is something more trying than the day of battle and that is the long course of training with its monotonous round of daily duties, its unvarying discipline, its privations and all the artificial and unnatural conditions of life at sea.

No recruiting officer wants a blind or deaf man enlisted and he is willing enough to have the medical examiner reject exaggerated cases but he often regards his doctor as indiscreet and overzealous in turning away men with defects of a minor character and it not infrequently happens at a recruiting station that the officer in charge and the medical examiner are in constant disagreement. Young medical officers often are overzealous and older ones seem to take a delight in sticking to the letter of the law and the officer in charge thus comes to regard his examiner as a spoke in his wheel. This is unfortunate. The safe rule for the doctor is to reject if in doubt, because that represents the best interests of his employer and that employer is not the recruiting officer but the government.

It is important, therefore, for the officer in charge to have a thorough appreciation of the vast significance of apparently trifling defects. A man with a crooked nose or a facial blemish that makes him the subject of constant ridicule seems like good timber for fighting but will he be good material for four years of training and eight or twelve years of service? Now the doctor who has had experience at sea knows that three-fourths of the daily attendance at sick call is made up of men with apparently trifling defects and in 50 per cent of them the defects antedate enlistment. A coal passer with obstructed nasal passages must breathe through his mouth and that means a dry throat, catarrh and from this, perhaps, ear trouble later, etc. He is forever hanging around the sick bay or going there for treatment. A deck-force man with an old ear

trouble or weak arches does the same. He is constantly late for or absent from drills and formations and periodically he has recurrences of deafness and discharge or declares himself unable to parade or stand a watch. Such a man is a nuisance in a division and unless unusually strong in morale is apt to become a loafer and shirker.

The apparently trivial defect at the recruiting office looms large at sea and with the first chagrin, disappointment or grievance the sufferer begins to magnify it for the purpose of getting a discharge or to avoid work. Often the man with a slight defect becomes hipped on the subject and comes to believe that he has a really serious ailment and the more disproportionate to its seriousness are his fears about himself the more valueless he becomes to the service.

The recruiting officer then should fully appreciate that the capable and experienced medical examiner who turns away one good man through excess of adherence to technical requirements usually turns away 50 whom he might perhaps pass technically but for his appreciation of service conditions and the conviction that such candidates would not last six months.

It might seem the part of wisdom to accept doubtful men on a chance because they can always be gotten rid of later by medical discharge but this is a superficial view of the case. A man who has a trifling ailment or defect and voluntarily enlists with it is not entitled to be surveyed the moment he becomes aggrieved at some detail of discipline or awakes to the fact that the navy is not all he had dreamed it to be. If he is refused a survey he at once begins to nurse a grievance, he feels he has been unjustly treated and so becomes a potential deserter.

Incalculable harm is done to the navy by accepting men who must eventually be surveyed or failing that will desert. Surveys are almost as demoralizing as court-martials and desertions, because in the minds of the dissatisfied they put a premium on infirmity. They are demoralizing not only to the ship but to the public. Men who are surveyed for defects antedating enlistment or desert because of physical defects and their consequences, have usually been in the service only long enough to experience the hardship inseparable from all beginnings and new enterprises and not long enough to appreciate the good features of the service. In the home communities to which they return, discharged men, or

men who pass for such though actually deserters, must explain their early return and they do so at the navy's expense reviling and misrepresenting the service. They thus become foci of misunderstanding and hostility among people not too inclined to military obligations and often harboring a deep though latent hostility to the service for its supposedly harsh administration. The young officer fêted and petted in strata of society from which we get no enlisted men (in times of peace) is apt to underestimate the importance of this spirit and attitude of the public. For purposes of recruiting we want the sympathy and esteem of the great middle class of the population. It is not by balls and parades that the navy is popularized but by the presence and testimony in countless communities of men who go home with an honorable discharge at the end of a completed enlistment, conscious of what the navy has done for them and eager to tell of it. The recruiting officer then should consider his service successful only in so far as he gets men who will stick and defectives do not stick. They fall by the wayside.

Be on good terms with your doctor. Do not let the young examiner feel that he incurs your displeasure every time he rejects a man but encourage him to maintain a high though just and reasonable standard. Make him feel that you will share the responsibility of accepting a man who impresses all observers with promise of real value to the service in spite of being a fraction of an inch or a pound below or above the set rules and on the other hand encourage him to turn away those who technically conform to requirements and yet through a variety of petty defects give good ground for the belief that there is a radical lack or a serious latent weakness concealed somewhere. Doctors are human like other people. If a battle ensues between recruiting officer and examining surgeon over every rejection the young examiner is liable to grow timid and pass anything, while the older man will get his back up and staunchly stick to the letter of the law. Harmony comes of frankness and mutual esteem and of a common purpose to think only of the *ultimate* good of the service as *a whole*. The medical requirements are based, like so many wise navy regulations, on wide experience of service conditions and requirements and of the underlying factors of health and resistance to disease and are not designed to secure men who simply conform to an arbitrary standard of physical proportions.

Medical officers are sometimes indifferent to their responsibilities or ignorant and inexperienced but on the other hand fairness compels the admission that indirect pressure is sometimes brought to bear on the medical examiner to squeeze men through as a matter of good nature or through a false conception of what makes for the reputation of the recruiting station and the recruiting officer.

Assuming that recruiting officer and examiner have used their utmost endeavor to determine the mental, moral and physical fitness of a candidate there remains one important measure for the prevention of desertion. It should be resorted to in advance of swearing him in. In a few well-chosen words the recruiting officer should explain the character of the obligations involved in the oath about to be administered and the lasting and terrible consequences of desertion. To the qualified candidate the swearing in is a solemn moment; the whole ordeal of examination with its novelty and formality has made an impression; he is flooded with new ideas and feelings. He will perhaps never again come into the hands of an officer while in such an impressionable state.

What an opportunity such an occasion offers for driving home one or two vital truths. The prospective recruit may be too upset to grasp the full significance of the obligations he is assuming but he probably does get the idea that he must not be a coward, go over to the enemy or run away from danger. Not one in a thousand perhaps fully realizes at the moment that once sworn in nothing but perjury and the sacrifice of his citizenship can get him out of the service simply because he may wish to leave. This is the time to picture desertion in its true light so that the candidate may appreciate from his first moment of service how radical and complete is the surrender of his personal rights. Say to him, for example: "Before you take the oath of allegiance to the United States, I warn you that once you have made that pledge you are a part of the navy and to leave it except by discharge in a legal manner is desertion. In time of war desertion is punishable by death. In time of peace you cannot be shot for deserting but you become an outcast in society, you cease to be a citizen of your country, you lose all right to be employed in any capacity by the government—letter carrier, postmaster, clerk, congressman, judge, whatever the future might bring. You cannot have the trust and confidence of your friends—they will turn from you as if you

were a leper and you become a cause of shame and disgrace to yourself, your family and your home community. In civil life if you do not like your job you can chuck it, walk off, go on strike. If you enter the military service and are not content you have to stay unless through sickness or because you are unsuitable the government decides it does not want *you*. There is no running away. To do that is to brand yourself as a criminal, to earn a penitentiary sentence at the hands of a court-martial. You might escape detection for a month or a year or many years but sooner or later the fact that you deserted from the navy will leak out and until that happens you will be made miserable by your guilty secret.

"If you have an enemy he learns about it and gives you away just as you are planning to marry or get a good job. If you succeed in life and run for public office your rival discovers it and brings it up against you and you slink off in disgrace.

"I have done my duty in explaining this to you in advance. If you have not the courage to stick it out through thick and thin go now."

(Here the recruiting officer pauses and gives the weakling a *bona fide* chance to depart. He may even say to his yeoman: "Open the door.")

"Before you take this oath you must understand that there is no getting out. Have you made up your mind? Very well."

If any depart he need not be chagrined. He has done the government a real service. Some of them will eventually enlist. Those who do not are a good riddance.

It is incredible that the government should not exact some such procedure as this, but still more incredible that a recruiting officer in this day and generation can assume the responsibility of enlisting men without having made clear to the raw youth, the simple countryman or the heedless lad of the city, the seriousness of the step he is taking.

The time of all times to make the candidate realize the gravity of desertion is before he is sworn in. Everything you say and do *before* that step he recognizes as a loyal, friendly counsel. It is advice from man to man. Once sworn in he hears you as an officer to a subordinate. Your warning is then in the nature of a threat. It is a routine military duty on your part and he soon receives admonition with a totally different mental attitude.

Leaving out of account for a moment the moral damage done to his shipmates and the discredit brought upon the service by every desertion, consider a single desertion in terms of cash to the government.

The cost of a single trained recruit equals the salaries of officers and men at training station plus cost of upkeep of entire station for given period of training, all divided by output of recruits for said period.

The cost of a single enlistment equals the salaries of officers and men at recruiting office plus rent of building, publicity expenses for given period divided by number of recruits obtained for that period plus transportation and subsistence until recruit begins training.

The cost of desertion equals the cost of enlistment, plus cost of training, plus cost of trial and punishment (*i. e.*, salaries of members of court, sentry, master at arms, clerical force, salaries of all reviewing authorities during the time devoted to the case, plus expenses of upkeep of penal instution to which the deserter is committed divided by number of inmates).

Compare all this with the cost involved in a two-minute talk to a group of candidates before they are sworn in, after say 20 minutes devoted to investigating the merits of each individual applicant.

The ideal recruiting officer is not he whose monthly and quarterly reports show the greatest number of men sworn in but rather he who has personally and painstakingly studied every candidate for at least a few moments and who would consider himself to be but an automaton and seriously neglectful of the full discharge of his duties if he merely swore in the men who have been passed by the doctor and arranged for their transportation to camp or training station.

A procession of human beings files through the recruiting office. They are not mere " cannon fodder " but plastic material for the navy to make into better citizens through its school of discipline and experience. The recruiting office is like the entrance examination at college. Those who are not certainly capable of profiting by the opportunity offered are not wanted and the recruiting officer should not pass a candidate about whom he has not attempted to make a thoughtful forecast based on the medical report and his own rapid summing up of the applicant before him.

Even if there were no obligation in the matter what a field this duty affords for a study of human physiognomy and human charac-

ter. The systematic study of recruits, the daily habit of trying by scrutiny, judicious inquiries and a verbal probing of their minds and hearts will develop enormously your capacity to read and estimate and handle men throughout your career and will save your recruiting office from becoming the resort of the bum, the vagrant, the embryonic or fully developed crook and the defective just as the medical examination protects it from men on crutches or those wearing glass eyes.

THE MEDICAL OFFICER AND DESERTION

The medical officer should fully realize his comprehensive responsibility for the health and comfort of the men. Merely to deploy skill in the treatment of acute cases of illness is not to discharge one's full duty. He has a larger province than this and better medical attention does not mean devoting more care to his patients but a full consideration and proper handling of many border-line cases; the detection of the feeble in mind or body; discriminating separation of the sick from the well; the impartial investigation of suspected malingerers and reporting them with full proof to the proper authority; the request for survey and discharge of men who daily demonstrate in minor details of behavior their incapacity to adapt themselves to military life. Again, men who from some abnormality of temperament, development or physical condition are unable to discharge the duties of their ratings in a satisfactory manner should be considered with a view to discharge from the service because punishment is sooner or later meted out to them for failure and, even if the failure was only due in part to a disability they cannot help, there results a sense of having been unjustly treated which constantly leads to desertion.

It is important to see that men have the capacity of mind and body necessary for the duties of their rating. There is a special type of physique for the coal passer; there is a standard of capacity and endurance for the trying duties of the engine room. Without going outside of his legitimate province, without being a busybody, without meddlesome interference but with patience, tact and judgment the medical officer can do much to help bring about a proper adjustment of man to job, and adjustment of this kind is indispensable for harmonious production.

The conscientious and capable medical officer must at an early stage of his career get away from the idea that his function is only

to treat the sick. It is his duty to concern himself with everything that bears upon the health and comfort of the personnel—food, clothing, ventilation, the relief of deadening ennui, the elimination of anything that may indirectly lower resistance and tone. When he sees an individual whose shoes are too small for comfort or worn out; a man whose clothing does not give him adequate protection; one whose personal habits are prejudicial to himself or others; whose sleeping quarters are damp; who works by insufficient illumination, he should make the circumstances the subject of representations to proper authority.

It is not enough, however, to make verbal or written recommendations and if they receive little or no attention to feel that the blame has been lifted from his shoulders. The zeal, the intelligence, the industry, the reliability of the man who makes a recommendation has a great deal to do with the action it obtains. Some men can get things done and others cannot. The medical officer who constantly fails to receive the needed cooperation and backing should not shrug his shoulders and drop the matter accusing his superiors of indifference and neglect but should subject his own conduct to very close scrutiny. Has he been indifferent, careless, neglectful, perfunctory in the past and have his representations received only such consideration as his reputation deserved? The medical officer who talks little and does much; who is occupied heart and soul with the welfare of the men; who triumphs over the temptation to spare himself trouble and who with genuine interest combines respectful demeanor with tact and perseverance will accomplish much.

The medical officer's ability to mingle informally with the men; his intimate contact with them at the bedside; the numerous examinations he is called on to make; the frequent occasions when he attends their families all give him opportunities for getting the viewpoint and sentiment of the crew individually and collectively. To know and understand them is to be able to help them and to become also a valuable adjunct to the authorities in maintaining discipline and morale and in preventing desertion. His influence is indirect but not the less powerful for that. The judicious advice, the sympathy, the encouragement that a doctor can impart by a friendly smile or a word in season can be an enormous help to good government on board ship if he is alive to his opportunities and anxious to live up to them.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

INDIRECT FIRE FOR NAVAL GUNS

By COMMANDER WALTER S. ANDERSON, U. S. Navy

The term "indirect fire," as used here, means the firing of guns without the target being visible to anyone at the guns or on board the firing ship.

Army artillerists are, of course, very familiar with indirect fire, the principles of which are not new. In fact, gunners on shore probably make use of indirect fire more than they do of direct fire. However, in the navy we have but little if anything to do with indirect fire, and at first glance it might appear that we have no use for it at all. There are occasions, however, when the principles of indirect fire could be very usefully applied to naval guns.

Some gunnery officers may reply that we are now using indirect fire when we use the director firing system for the elevation of guns and the "follow the pointer system" for training them, because it is possible to fire our guns in this manner without the gun-pointer seeing the target. It is true this is in a sense indirect fire, but it requires for its accomplishment at least one observer on the ship who does see the target and it is, therefore, not indirect fire in the sense of the term which is employed in this article.

As I have never seen any reference to the possible use of indirect fire for guns on board ship in any of our standard books or articles on gunnery, nor even heard it discussed, it seemed that these notes might prove useful.

In 1914 I was executive officer of the *Des Moines*, lying at that time in the Panuco River at Tampico, Mexico. At this time occurred the so-called "Tampico Incident." Mexicans had arrested and removed from their ship's boat, an officer and a boat's crew from the U. S. S. *Dolphin*. Certain demands had been made, and the entire situation was one which indicated a strong proba-

bility of active operations. That this was correct was proved soon afterwards by the taking of Vera Cruz.

Plans were of course made for protecting American lives and property at Tampico, the measures including taking the city of Tampico for that purpose if necessary. It was very probable that in that event it would be useful to be able to direct heavy gun fire into the out-skirts of Tampico. As the city of Tampico intervened and cut off the ship's view from most of the country to the north and west of the city, it at first seemed that our naval guns mounted on board ship would be useless for this purpose.

However, it occurred to me that we could make use of the principles of "indirect fire," and we prepared to do so if necessary. Our scheme was a simple one. It was easy of application under the conditions there found, because the ship lay for hours on a steady heading, without rolling. It could, however, be applied even though there was some slight motion to the ship.

It was proposed to mark off a chart in squares giving a definite designation to each square.

An observer, that is, a spotter, together with signalmen, was to be stationed in a definite elevated position giving a commanding view of the surrounding country and in plain view of the ship. He was to have a chart marked in squares and a similar ch[illegible] was to be on board ship. All our guns had the usual bras[illegible] circles showing their train in degrees from the bow as a reference point. When a signal was received from the observing station indicating the location to be put under fire the navigator was to ascertain its bearing from the ship's head which would give us the point of train or target bearing. It is conceded that this is crude, but later on it will be indicated how greater accuracy was to be obtained. The navigator was also to give the distance in yards from the ship's position to the location to be brought under fire, which would give us the range. For any given position of the ship a table of ranges could, of course, be made up in advance for the centers of the various squares.

Assume that we now have the guns trained toward the designated location, which we will call the target, and that we know the range. The usual ballistic calculations are made to obtain the ballistic correction to be applied to the actual range, and to obtain the original deflection. Remember that the sights have not been

moved yet; they read zero in range and 50 in deflection, that is, they are at the median point in deflection.

In army firing on shore with the guns trained as desired, the elevation for indirect firing would be obtained by the use of the gunner's quadrant, or a sight based upon the principle of a gunner's quadrant. In the case of our smaller ships, however, we assume that there are no gunner's quadrants available on board. There are, of course, carpenter's levels which can be used.

Let us take the simplest case first. The gun is properly trained. Level the gun. This can be done with the aid of a carpenter's level, or for practical purposes it could probably be done accurately enough without the aid of the level as will be seen later. We now want a point of aim as a reference point. With the sights set range zero, deflection 50, look through the sights. If the cross-wires are by chance on an object on shore in a position readily identified which can be returned to after the sight is moved, we are in luck, and have the simplest proposition of all. This seems like a far-fetched supposition, but when a gunboat or a small cruiser is in a river with trees or buildings on the bank, it is not at all an improbable assumption as actual trial at Tampico showed.

Assumed then that the sight is on a definite point of aim. Now move the sights until its range reading is the initial sight bar range, viz., actual range corrected by ballistic correction. Also put the initial deflection on the deflection scale. These corrections have, of course, depressed the telescopic sight and moved it laterally. Now elevate the gun and train as necessary in order to bring the cross wires of the sight back on the point of aim. The gun is now properly laid to fire at the designated target.

Suppose no carpenter's level is available for leveling the gun, and we desire to level it as nearly as practicable. With the gun trained as already mentioned and approximately level, look through the sight and slightly elevate or depress the gun until the cross-wires are brought on a point of aim on shore which is judged to be at the same height as the transverse axis of the sight. It is conceded that this is to be done by the "seaman's eye," and is liable to some error. The probable error has not as much effect as one might suppose, however, as a vertical error of one foot at a distance of 600 yards would introduce an error of less than two minutes of arc in the elevation of the gun. At 4000 yards this would introduce a range error of 50 yards, or less.

Suppose in looking through the sight for a point of aim there is no definite point sufficiently conspicuous to serve. One solution is to send men on shore with a marker pole or flag. The marker carried by these men would then constitute a point of aim and could be moved to the desired position by these men obeying signalled orders from the ship.

To the possible objection that these men are standing in almost the direction of fire the answer would appear to be that if thousands of men in Europe had no objection to standing in the direct line of fire with a barrage going over their heads, there is no reason why naval men could not do likewise. The guns being elevated, the shell would pass far above their heads. In this connection it should be noted that the fire control officer, should, by an inspection of the range table, which shows the maximum ordinate of the trajectory, assure himself that the shell will pass clear above any intervening hills, buildings or other obstructions. There is slight possibility of intervening hills or buildings obstructing the fire if the range is at all great.

Suppose in looking for an original point of aim none is found and it is impracticable to send men on shore with a marker. The case now is just as simple in principle, but a little more difficult in its application. Assume the gun trained toward the target, gun level, sight set with range zero, deflection 50. Do not move the gun, but move the sight as necessary, and no more than necessary, to bring it upon a chosen, definite point of aim. Make a note of the range and deflection reading. These are the corrections which must be applied to the ordinarily proper range and deflection reading when the gun is actually laid for firing. Let us call these "point of aim corrections." If the point of aim correction in range is but slight, for practical purposes it could be simply applied in yards as an additive or a subtractive correction to the proper initial sight bar range.

Theoretically there is a slight error in this, but if the correction is small the slight error is negligible. If the point of aim range correction is considerable, which is improbable, to obtain the proper sight bar reading in range for laying the gun is a bit more complicated. Procedure is as follows:

Enter the range table with the proper sight bar range as a range, and pick out the angle of departure corresponding to it. Also with the point of aim correction as a range, pick out the

angle of departure corresponding to it. Combine these two angles of departure. With their algebraic sum as an angle of departure, enter the range table and pick out the range. This becomes a sight bar range reading for laying the gun. Set the sight bar to this reading. Correct the proper initial deflection by the deflection point of aim correction, thus giving the deflection for laying the gun. Put this deflection on the sight. Now move the gun until the cross-wires are brought on the point of aim. The gun is now properly laid to fire at the designated target.

So far we have winked at the fact that even if everything were perfect, there would be a lateral dispersion at the target equal to the lateral difference in the guns' positions. For such operations this is probably not undesirable. In the army they actually put certain varying deflection corrections on the various guns of a battery to give them a certain amount of lateral spread.

If it is desired to reduce the lateral spread, it is easy to figure out and apply for any range the deflection corrections which will converge the guns or will diverge them to any desired amount. One unit on the deflection scale, a mil, will cause a lateral alteration in the fall of the shot equal to 1/1000 of the range. In this same way, should it be necessary for any reason to converge the sights of all guns of a battery upon one point of aim, there must be individual deflection corrections for each gun, in order to make them fire parallel or to converge at the target, or to give a certain spread.

In any dealing with deflection in this way where deflection of the guns is to differ, one gun must be taken as a reference or a "master gun." Tables previously prepared can then show what deflection correction for each of the other guns is to be applied to produce certain convergence or certain spread.

As conceded originally the guns were laid for train very crudely, with the possibility of a quarter of a degree or more of error, with the facilities then available on board the *Des Moines*. Of course, vessels equipped with a director installation for their small guns can apply the principles outlined in this article by simpler methods. However, we will still consider a vessel of the *Des Moines*' gunnery equipment. Due to the crudeness in laying the guns for train, there is a probability that the lateral dispersion might be excessive and difficult of elimination, if several guns commenced fire at once. It would probably be desirable to open

fire with the master gun alone. Corrections to range and deflection should then be made consistent with the reports of the spotter and the guns laid according to these corrections. Fire could then be opened by additional guns one at a time, correcting the lateral dispersion by deflection corrections as necessary to converge the first two guns, before the third is permitted to fire. The third gun could then open fire, convergence corrections would then be made, and other guns would open fire successively in the same way.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

NAVIGATION NOTES

By COMMANDER J. F. GREEN, U. S. Navy

No new principles in navigation are contained in these notes. There are indeed few things in navigation that are new. But the matter discussed herein has not, to the writer's knowledge, been presented in just the manner in which it is given here, and it is hoped that this discussion will be of practical value to beginning navigators at least. As the subjects treated are unrelated, they are presented under separate headings.

I. *Star identification by forecasting their positions in the heavens.*

It is perhaps safe to say that the officer inexperienced in navigation is somewhat inclined to pass up the use of stars for navigational purposes because he feels that they involve more complications than sights of the sun. This is not the case. If a good horizon can be obtained, as it usually can after sunset and about daybreak, starsights can be taken easily and accurately and good fixes obtained by crossing their Sumner lines. A good navigator, especially on a speedy ship should always obtain star fixes both night and morning. Planets involve no more difficulties than do fixed stars.

Probably the greatest difficulty that the beginning navigator struggles with is his lack of knowledge what stars to take, or his inability to find out what star he has taken a sight of. He has seen various treatises on star identification, but probably most of them looked so complicated that he didn't think he could get anything out of them. Indeed most of them are complicated. Of course there is the Star Identification Table which is an excellent book

when one is familiar with its use. But even so it takes time to dig a star out of it.

There is a method though, a simple method, by which a navigator can forecast the position of stars, by bearing and altitude, at any instant. He can select such stars as will give a good cut with their lines, he can know just where to look for them, and, having taken sights, can work them out at once with certainty as to their identity, though he may know nothing about their constellations.

The problem given below to illustrate this is a practical one such as a navigator on a cruising ship would encounter. The problem is to forecast available stars at sunrise on a moving ship. The principle is the same however for forecasting available stars at sunset.

Problem.—May 10, 1920, a navigator has fixed his position at 8 p. m. by watch, as Lat. 34° 59′ 40″ N., Long. 72° 49′ 30″ W. The captain sets course for the night as 330° true, speed 12 knots, but wishes to change course at 6 a. m. next morning.

At 8 p. m. the C—W is $4^h\ 50^m\ 01^s$. Chronom. fast on G. M. T. $0^h\ 02^m\ 00^s$.

The navigator wishes to get a star fix before 6 a. m. next morning. He decides to take sights one-half hour before sunrise. He leaves a call for 45 minutes before sunrise. What time will this be by watch?

What planets and stars (of magnitudes under plus 1.5) will be visible? Which of these will make a good cut and what will be their true bearings and altitudes?

Solution.—First find the L. M. T. corresponding to 8 p. m. by watch:

	h	m	s
W. T.	8	00	00
C—W	4	50	01
C. F.	12	50	01
C. C.	0	02	00
G. M. T.	12	48	01 (10)
Long. W	4	51	18
L. M. T.	7	56	43

Now using the latitude at 8 p. m. which we will call Lat.$_1$, find the time of sunrise for that latitude and get the hour-angle to sunrise for that latitude.

	h	m	s	
L. M. T. of sunrise Lat.$_1$	17	00	00	(from N. A., Table VI)
L. M. T. at 8 p. m.	7	56	43	
H. A. to S. R. for Lat.$_1$	9	03	17	
	=9.06 hours			

The approximate run to S. R. will be $9.06 \times 12 = 108.7$ miles.

The approximate position at S. R. will be

True course	Dist.	N.	W.
330°	108.7	94.1	54.4

Lat.$_1$	34°	59′	40″	N.	Mid. Lat. 35.8°.
l	1	34	06	N.	Change in longitude per hour at 12
Lat.$_2$	36	33	46	N.	knots speed = 7.4′.

It is not necessary to find the longitude in this step.

Now use Lat.$_2$ to find a nearer H. A. to S. R.

	h	m	
L. M. T. of S. R. for Lat.$_2$	16	56.5	(from N. A.)
L. M. T. at 8 p. m.	7	56.7	
H. A. to S. R.	8	59.8	
	=539.8 minutes		

Hence,

$$\text{Interval to S. R.} = \frac{539.8 \times 15}{900 - 7.4} = \frac{8097}{892.6}$$

	log 3.90832
	log 2.95066
Interval to S. R. 9.071 hours	log 0.95766

In this problem it is assumed that there is no current.

Run to S. R. $9.071 \times 12 = 108.9$ miles.

T. C.	Dist.	N.	W.	D.
330	108.9	94.3	54.5	67.2

	°	′	″			°	′	″	
Lat.$_1$	34	59	40	N.	Long.	72	49	30	W.
l	1	34	18	N.	D	1	07	12	W.
Lat.$_2$	36	33	58	N.	Long.$_2$	73	56	42	W.

L_0 35.8°

This position will be very close to the exact position at S. R. and may be assumed as such. Now for results.

	h	m	s
L. M. T. of S. R. (Position 3)	16	56	30
Long. 3	4	55	46.8
G. M. T. of S. R.	21	52	16.8(10)
C. C. (sign reversed)	0	02	00
C. F.	9	54	16.8
C—W	4	50	01
W. T. of S. R.	5	04	15.8
Less one-half hour	0	30	00
W. T. to take sights	4	34	15.8
Less 15 minutes	0	15	00
W. T. to call navigator	4	19	15.8

Now to find the available stars. We know that the L. S. T. at any time and place is the R. A. of the meridian at that time and place. Therefore, find the L. S. T. for the L. M. T. at which we are going to take the sights.

	h	m	s		h	m	s
L. M. T. of S. R.	16	56	30	G. M. T. of S. R.	21	52	16.8(10)
Less ½ hour	00	30	00		00	30	00
L. M. T. of sight	16	26	30	G. M. T. of sight	21	22	16.8(10)
R. A. M. ⊙	3	11	55.6				
Cor. Table III		3	30.6				
L. S. T. of sight	19	41	56.2				

Now look up the stars of first magnitude and also the planets and see which ones have right ascensions equal to the L. S. T. given above or within four or five hours on either side of it. If the R. A. of any star or planet is equal to the L. S. T. at time of sight that star will of course be on the meridian. Stars whose R. A.'s are greater or less than this L. S. T. will be to the east or west of the meridian. To make a good cut stars should be chosen which are in adjacent quadrants. The declinations given in the N. A. will help in choosing satisfactory stars. By plotting the stars on the plane of the Equinoctial or by determining whether their

H. A.'s are minus or plus will show whether the stars bear east or west of the meridian.

By comparing the L. S. T. at sight with the R. A.'s of the planets we find that no planets are available. Mars is just about setting.

But there are several bright stars available. Of these we may select Antares, Vega, Altair and Deneb, all of which are of magnitude under plus 1.5 and are within about four hours east or west of our meridian. Altair is within about four minutes of the meridian and would make a good latitude sight. It is not necessary to work out its bearing as it would bear nearly south and would be unmistakable. Antares has high southerly declination and is probably of low altitude. Vega and Deneb probably make a good cut as Vega is west of the meridian and has north declination while Deneb is east of the meridian with north declination. That is, they are in adjacent quadrants. Now let us find their bearings.

	h	m	s		h	m	s
L. S. T. of sight	19	41	56.2		19	41	56.2
R. A. Vega	18	34	16.2	R. A. Deneb	20	38	44.2
H. A. Vega	+ 1	07	40	H. A. Deneb	(−)0	56	48
Dec. Vega	+38°	42.4′		Dec. Deneb	+44°	59.5′	
Lat.	36°	33′	58″ N.	Lat.	36°	33′	58″ N.
Bearing Vega	284°	02′		Bearing Deneb	47°	28′	

The bearing of a navigational star would ordinarily be sufficient identification, but, if more certain identification is desired, take the H. A., Lat. and Dec. as given above and solve for the altitude in each case by the Mark St. Hilaire cosin-haversin method. In this case we find altitude of Vega 76° 27′ 15″ altitude of Deneb 76° 22′ 15″, and the stars can be identified without any doubt.

Discussion.—It may be objected that this method is a long one, but such is not the case. As treated here it is somewhat lengthy, but this is because considerable accuracy has been sought.

In this case the ship ran on a course within 30° of north, at 12 knots' speed which is a fair speed for cruising at night. It will be seen, however, that the resulting run for S. R. Lat.$_1$ differed only 0.2 mile from that of S. R. for Lat.$_2$ Therefore, unless the ship runs about north or south at a very high speed, the

process of finding the position at sunrise or sunset, and hence the L. M. T. of sunrise or sunset, can be much shortened. The run can be stepped off on a chart, the position at S. R. found from chart and L. M. T. of S. R. taken from N. A. for that latitude. Convert this to L. S. T. Find the star's H. A. and Dec. and using Weir's diagram its bearing is found at once. Not more than 20 minutes are necessary to locate all good stars available and it is a great satisfaction to a navigator to put them in his pocket and be able to identify a star at once and know that it is good without having to go through the star identification table after the sight is taken. As before stated this method is equally applicable to stars taken at sunset. In this case the bright stars come out before their constellations do and this is the best time for taking them while the horizon is good.

II. *Use of interval to noon method when course is changed between morning sight and noon.*

Pages 676-684 of the 1918 edition of Muir's Navigation describe the interval to noon method of navigation and its use in solving a day's work. It is a very pretty method and a good one, *provided no change of course or speed is made between the time of morning sight and L. A. N.* If a change of either is made, the denominator factor in the interval to noon equation, which represents the change of longitude per hour due to speed, becomes indeterminable. Now as every one knows, naval vessels frequently maneuver all the forenoon and a navigational method which does not allow of a change of course is not a good method.

The following problem and solution is given to show that the interval to noon method can be used though the ship may maneuver at varying courses and speeds:

May 14, 1920, civil date, a navigator has fixed his position, by star sights, at 6 a. m., by watch, at Lat. 37° 17′ 00″ N., Long. 72° 27′ 00″ W. Ship then runs on course 150° true at 12 knots' speed until 7.30 a. m. by watch, of same day, when the navigator gets a sight of sun's lower limb which he works by St. Hilaire method with results as follows: Altitude difference 01.0′ toward; bearing of ⊙ true 95°; W. T. $7^h\ 30^m\ 00^s$; C—W $4^h\ 48^m\ 00^s$; Chronom. fast on G. M. T. $0^h\ 07^m\ 50.9^s$.

Ship then maneuvers as follows until 11 a. m. by watch:

T. C.	Time on course. Minutes	Speed. Knots
90	20	12
45	68	10
270	92	12
225	30	10

At 11 a. m. by watch course is set at 150° true, speed 12 knots until L. A. N. At L. A. N. the sun's lower limb is observed 71° 38′ 00″. I. C. (−) 1′ 00″. Height of eye 30 feet.

Find D. R. position at 7.30 a. m. by watch.

Navigator's position at 7.30 a. m. by watch and current per hour in longitude.

Error of watch on L. A. T. at 7.30 a. m. by watch.

Navigator's position at 11 a. m. by watch.

Error of watch on L. A. T. at 11 a. m. by watch.

Interval to noon from 11 a. m. by watch.

Navigator's position at L. A. N.

Constant for L. A. N.

True noon latitude.

True noon longitude.

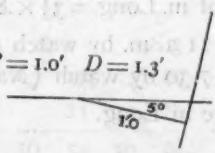
NOTE:—By navigator's position is meant the most accurate position obtainable with the data, but which is not a fix.

Solution.—

Run from 6 a. m. to 7.30 a. m. (by watch)

Course	Dist.	l	p	D	L_0
150°	18	15.6	9	11.3	37.2°

Lat. left	37°	17′	00″	N.
l		15	36	S.
Lat. in	37	01	24	N.



Long. left	72°	27′	00″	W.
D		11	18	E.
7.30 a. m. Long. in	72	15	42	W.
Current in Long. for 1.5 hours		1	18	E.
Nav. Pos. at 7.30 a. m. by watch — Long. Cor.	72	14	24	W.
Nav. Pos. at 7.30 a. m. by watch — Lat.	37	01	24	N.

Current in Long. per hour $= \frac{1.3}{1.5} = .87$′E. $F = .11$′.

Watch Error

W. T.		7	30	00
C—W		4	48	00
C. F.		12	18	00
C. C.	(−)	0	07	50.9
G. M. T.		0	10	09.1 (14)
Eqt. plus			3	48.5
G. A. T.		0	13	57.6
Long. Cor.		4	48	57.6
L. A. T.		19	25	00
W. T.		19	30	00
Watch error		0	5	00 Fast on

L. A. T. at 7.30 a. m. by watch.

Run to 11 a. m. by Watch

True course	Dist.	N.	S.	E.	W.
90°	4.0			4.0	
45	11.3	8.0		8.0	
270	18.4				18.4
225	5.0		3.5		3.5
		4.5 N.			9.9 W.

L_0 37°
D = 12.4 W.

Lat. at 7.30 (W. T.)	37°	01′	24″	N.	Long.	72° 14′ 24″	W.
l		4	30	N.	D	12 24	W.
Lat. 11 a. m. by watch	37	05	54	N.	Long.	72 26 48	W.
= Lat. of Nav. Pos.							
Current in Long. = $3\frac{1}{2} \times .87$						3 02.7	E.
Long. 11 a. m. by watch (Nav. Pos.)						72 23 45.3	W.
Long. 7.30 by watch (Nav. Pos.)						72 14 24	
Change in Long.						9 21.3	W.
						= 0^m 37.4^s	

	h	m	s	
Watch error at 7.30 a. m.	0	5	00	Fast
Watch error at 11.00 a. m.	0	05	37.4	Fast on L. A. T.

It is seen here that the watch was fast on L. A. T. 0^h 05^m 00^s at 7.30 a. m. by watch. From 7.30 a. m. to 11 a. m. (W. T.) the watch has been carried from one locality to another which is 9′ 21.3″ to the west of the first locality. As the watch has not been reset, it has, due to the change of longitude to the westward,

become faster on the new locality by the amount of the change of longitude expressed in time. If the change had been made to the eastward it would have become slower by that amount. No account is taken here of the mechanical gain or loss of the watch as in a navigating watch this should be inconsiderable for the interval of time involved.

It is now only necessary to find the L. A. T. corresponding to 11 a. m. by watch and the interval to noon method can be taken up.

It may be said that, while the even hour of 11 a. m. is used in this problem, this solution is equally applicable should the maneuvering cease at any time before or after 11 a. m. so long as the time of steadying on the last course is known.

Watch error	0	05	37.4	Fast at 11 a. m.
W. T.	23	00	00	(Expressed astronomically)
L. A. T.	22	54	22.6	
H. A. (−)	1	05	37.4	= Arc 16° 24′ 21″

Run in Longitude for One Hour

Course	Dist.	*l.*	*p.*	*D.*	L_0
150°	12	10.4	6.0	7.5	37°

Interval to noon $\frac{984.35}{900-7.5-.87} = 1.104$

$= 1^h\ 06^m\ 14.4^s$

W. T.	11	00	00
W. T. of L. A. N.	12	06	14.4

Run from 11 a. m. (by Watch) to L. A. N.

Course	Dist.	*l.*	*p.*	*D.*
150°	13.2	11.4	6.6	8.3

Lat. (Nav. Pos.) 11 a. m.	37°	05′	54″	N.
l		11	24	S.
Lat. (Nav. Pos.) L. A. N.	36	54	30	N.
L_0 37°				
Long. (Nav. Pos.) 11 a. m.	72°	23′	45″	W.
D		08	18	E.
	72	15	27	W.
Current in Long. = 1.104 × .87			57.6	E.
Long. (Nav. Pos.) L. A. N.	72	14	29.4	W.

Noon Constant—True Lat. and Long. at L. A. N.

	h	m	s		°	′	″
L. A. T. of L. A. N	0	0	0	T. 46+		10	22
Long. (Nav. Pos.) L. A. N.	4	48	58	Sub C (−)		08	
G. A. T. of L. A. N.	4	48	58(14)	C	00	09	14
Eqt.	(−)	3	48.5	$90+d$	108	40	09
G. M. T. of L. A. N.	4	45	09.5	K	108	30	55
⊙ Dec. +	18	40	09	h Obs.	71	38	00
	90			Lat. true	36	52	55 N.
$90+d$	108	40	09	Lat. (Nav. Pos.)	36	54	30 N.
App. Lat.	36	54	30	Δ Lat.		1	35 S.
App. Alt.	71	45	39				

I. C. (−) 0 01 00

	°	′	″	
Long. (Nav. Pos.)	72	14	29.4	W.
Δ Long. for Δ Lat.			10.4	W.
Long. true	72	14	39.8	W.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

PSYCHOLOGY AND THE NAVY

By LIEUTENANT F. H. GILMER, U. S. Navy

For years the navy has recognized leadership and the handling of men as the paramount subject of a naval officer's consideration and yet they have failed to realize that these subjects are but subtopics of the science of psychology. Psychology is a science in spite of the misconception of many people that connect it with Ouija boards, spiritualists and mind-reading. The science of psychology has found its place in the curriculum of the leading universities of the country. The navy, which generally leads the country in the development of new sciences, is lagging behind in this field. Psychology has entered the industrial world and by finding the right job for a man has greatly increased the efficiency of the man. It has entered the educational world and by examinations it has determined what limits are put on a man's ability by his mental make-up. In conjunction with the criminal world psychology is doing much to abolish the old dungeon form of penitentiary and bring in the reformatory.

The relations existing between psychology and the navy naturally divide themselves into two parts: First, those concerning the good that the service would derive from psychology, and second, those concerning the methods of introducing psychology into the navy.

If psychology were introduced in the recruiting service of the navy, it would greatly decrease the number of desertions by weeding out the men whose mental make-up was such as to cause them to desert; it would also prevent the enlistment of men that were mentally unfitted—a thing which rarely happens, but a thing which should never happen. If psychology were used after a man had enlisted in the service, it would then determine the job for

which he was best fitted. This would increase his efficiency and his satisfaction. An increase in the efficiency of a single man means an increase in the efficiency of the service as a whole. The satisfaction of a single man is of vast importance; for the old adage, "A single bad apple will spoil a barrel of apples," still holds true.

Psychology could be used in the selection of candidates for the naval academy as it has been used in the selection of students for several of the leading universities of the country. In this same manner it would greatly decrease the percentage of men that enter the Naval Academy and failed to graduate. By continued use of psychology throughout the four years at the Naval Academy the men that might graduate from the Academy and yet who were doomed to failure in the service would be weeded out. The Academy would no longer make poor officers out of fine farmers, as it often does when placing its entire dependence upon mental entrance examinations.

Perhaps the most important and far-reaching effect of psychology would be the development of the ability of the officer personnel in the arts of "handling men" and "leadership." When the service desires an officer to become an expert in the handling of a piece of machinery, they take great pains to teach him the manner in which that machinery is made, the manner in which it functions and the manner of controlling these functions. The human mind is the greatest machine in the world. Psychology is the science of the human mind; by it we learn the construction of the mind, the manner in which the mind works and the way in which to direct that mind so as to derive the most efficiency. The service should instruct an officer in this science; it should equip him so that he can at least handle men with the same skill that he handles machines.

There are three methods of introducing psychology into the service: First, by the employment of civilian experts in the Navy Department at Washington. These civilians could construct charts and prepare the necessary psychological examinations for the various fields in the service. Secondly, psychology could be introduced in the curriculum of the Naval Academy, the post-graduate course, and possibly the war college. The third, and by far the best method, would be to select several young officers—

send them to one of the leading universities of the country—preferably the University of Pennsylvania or Columbia—and there let them pursue the study of psychology. These men could afterwards be used in the same manner in which civilian psychologists were used in the first two methods and their previous naval training would give them a decided advantage over the civilian psychologists.

In concluding it is only necessary to state that psychology will play an important rôle in many branches of the naval service and that it is expedient that it be introduced into the naval service as soon as possible.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

CONSTITUTION AND BY-LAWS[1]

ARTICLE I.—TITLE

This organization shall be called the United States Naval Institute.

ARTICLE II.—OBJECT

Its object is the advancement of professional, literary, and scientific knowledge in the navy.

ARTICLE III.—HEADQUARTERS

The headquarters of the Institute shall be at the United States Naval Academy, Annapolis, Md., or in such other place as the Board of Control may select.

ARTICLE IV.—OFFICERS

The officers shall be as follows:

A President.
A Vice-President.
A Board of Control.
A Secretary and Treasurer.

ARTICLE V.—ELECTION OF OFFICERS

SECTION 1. There shall be a meeting of the Institute at headquarters on the second Friday in October of each year, of which at least two weeks' notice shall be given, at which meeting all the foregoing officers shall be elected by ballot in open session, and a majority of votes given by presence or proxy shall elect; regular or life members only being eligible for office.

[1] As amended at the annual meeting of the U. S. Naval Institute, October 8, 1920.

SEC. 2. Absent members who have the constitutional right to vote may vote by proxy at such elections, and in the same manner on all questions involving changes in the Constitution and By-Laws, and upon questions involving the expulsion of members and the election of honorary members. On all other questions voting must be by actual presence. Life members shall have the full right of regular members to vote on every question. Honorary and associate members shall not have the privilege of voting. Each proxy must be signed by the member whose vote is to be represented.

SEC. 3. Members elected to the position of officers of the Institute will assume their respective duties at the date from which elected.

SEC. 4. Casual vacancies in the offices of the Institute may be temporarily filled by the Board of Control.

ARTICLE VI.—DUTIES OF OFFICERS

SECTION 1. The President shall preside at meetings of the Institute and of the Board of Control at which he may be present.

SEC. 2. In the absence of the President, the Vice-President shall preside. In the absence of both President and the Vice-President the Senior member present of the Board of Control shall preside.

SEC. 3. The Board of Control shall consist of nine members, of whom the President, Vice-President and the Secretary and Treasurer shall be members, *ex officio,* the other six shall be members in good standing, regular or life. The duties of the Board of Control shall be the management of all the financial and administrative business of the Institute, including the censorship, printing, and control of its publications. The Secretary and Treasurer shall be its medium of communication and the recorder of its transactions. Regular monthly meetings of the Board of Control shall be held when called by the Secretary and Treasurer, and he shall issue a call for a special meeting at any time upon the written request of two members of the Board. A quorum shall consist of four members. It shall be the duty of this Board to appoint a committee of three of its own members to audit and certify the books and accounts of the Secretary and Treasurer once every year.

SEC. 4. The Secretary and Treasurer shall keep a register of the members in which shall be noted all changes; an authenticated copy of the Constitution and By-Laws in force; a journal of the Proceedings of the Institute; a separate journal of the transactions of the Board of Control; a receipt and expenditure book; an account-current with each member. Under the authority of the Board of Control, he shall be the disbursing and purchasing officer of the Institute and the custodian of the funds, securities, and assets, and it shall be his duty to furnish members with receipts for dues paid. He shall attend to all correspondence and keep a record thereof, give due notice of meetings of the Institute and Board of Control, have charge of the stenographer and copyists employed to prepare records of the Proceedings, and he shall distribute all publications. The books of accounts of the Institute shall always be open to inspection by any member.

ARTICLE VII.—MEMBERSHIP

SECTION 1. The Institute shall consist of regular, life, honorary, and associate members.

SEC. 2. Officers of the navy, marine corps, and all civil officers attached to the naval service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the navy subsequent to joining the Institute will be regarded as belonging to the class described in this section.

SEC. 3. The Prize Essayist of each year shall be a life member without payment of fee.

SEC. 4. Honorary members shall be selected from distinguished naval and military officers, and from eminent men of learning in civil life. The Secretary and Assistant Secretary of the Navy shall be, *ex officio*, honorary members. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control. To be declared elected, they must receive the affirmative vote of three-quarters of the members represented at regular or stated meetings, either in person or by proxy.

SEC. 5. Associate members shall be elected from officers of the army, revenue marine, foreign officers of the naval and mili-

tary professions, and from persons in civil life who may be interested in the purposes of the Institute.

SEC. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the navy and marine corps shall not at any time exceed one hundred (100).

SEC. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control. The Board of Control will at each regular meeting ballot on the nominations submitted for election and nominees receiving a majority of the votes of the Board membership shall be considered elected as nominated to associate or life membership in the Naval Institute.

SEC. 8. The annual dues for regular and associate members shall be three dollars, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute and upon the first day of each succeeding January. The fee for life membership shall be forty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

SEC. 9. No member of the Institute shall be dismissed except by recommendation of the Board of Control, and by the affirmative votes of two-thirds of such members of the Institute as may vote at any regular or called meeting, of which at least two months' notice shall be given; members of the Institute must be given an opportunity to vote on a ballot mailed by the Secretary and Treasurer at least two months before the meeting in question. Without the recommendation of the Board of Control, no member can be dismissed except by a three-fourths vote taken as detailed in the foregoing sentence.

SEC. 10. Members in arrears more than three years may, at the discretion of the Board of Control, be dropped for non-payment of dues. Membership continues until a member has been dismissed, dropped, or his resignation in writing has been received.

ARTICLE VIII.—RESERVE FUND

There shall be a Reserve Fund, consisting of the $3050 originally credited to that fund, together with all life-membership fees which have been or may hereafter be received, and the principal of this fund shall be held in perpetuity to guarantee the future interest of life members. The Reserve Fund shall be invested under the direction of the Board of Control, but no part of that fund shall be invested in any other than United States bonds unless by the unanimous vote of the Board of Control given in writing at a special meeting called for the purpose.

ARTICLE IX.—MEETINGS

SECTION 1. Meetings of the Institute shall be called by the Secretary and Treasurer when directed by the Board of Control.

SEC. 2. Notice of meetings shall state the business that will be brought before the meeting.

SEC. 3. A stenographer may be employed when authorized by the Board of Control.

ARTICLE X.—PAPERS AND PROCEEDINGS

SECTION 1. There shall be published quarterly, or as much oftener as the Board of Control may decide, "PROCEEDINGS OF THE U. S. NAVAL INSTITUTE," containing such papers and discussions as are approved by the Board of Control, together with editorial and professional notes deemed of value to the service.

SEC. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

SEC. 3. Copies of the PROCEEDINGS and complete sets may be sold at a charge fixed by the Board of Control, and the Board shall also fix the price of annual subscription for others than members.

SEC. 4. A receipt and expenditure account of the Institute's publications, showing the number on hand, shall be included in the report of the Secretary and Treasurer of each year.

SEC. 5. The Board of Control shall decide the size of the edition of each number of the PROCEEDINGS to be published, and also the number of reprints.

SEC. 6. The PROCEEDINGS shall be copyrighted in behalf of the Institute by a trustee appointed by the Board of Control.

ARTICLE XI.—ANNUAL PRIZE ESSAY

SECTION 1. A prize of two hundred dollars, with a gold medal, shall be offered each year for the best essay on any subject pertaining to the naval profession.

SEC. 2. The award for the above-named prize shall be made by the Board of Control, voting by ballot; and the time and manner of submitting such essays shall be determined and announced by said board.

SEC. 3. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of a gold medal.

ARTICLE XII.—AMENDMENTS

No addition or amendment to the Constitution shall be made without the assent of two-thirds of the members voting; the By-Laws, however, may be amended by a majority vote. Notice of proposed changes or additions, together with a form of ballot on same, shall be mailed by the Secretary and Treasurer to each life and regular member at least two months before action is taken.

BY-LAWS

ARTICLE I

The rules of the United States House of Representatives shall, in so far as applicable, govern the parliamentary proceedings of the Society.

ARTICLE II

1. At both regular and stated meetings the routine of business shall be as follows:

2. At executive meetings, the President, or, in his absence, the Vice-President, or, in the absence of both, a member of the Board

of Control, shall call the meeting to order, and occupy the chair during the session; in the absence of these, the meeting shall appoint a Chairman.

3. At meetings for the presentation of papers and discussion, the Society shall be called to order as above provided, and a Chairman shall be appointed by the presiding officer, reference being had to the subject about to be discussed, and an expert in the specialty to which it relates being selected.

4. At regular meetings after the presentation of the paper of the evening, or on the termination of the arguments made by members appointed to or voluntarily appearing to enter into formal discussion, the Chairman shall make such review of the paper as he may deem proper. Informal discussion shall then be in order, each speaker being allowed not exceeding ten minutes in the aggregate, unless by special consent of the Society. The author of the paper shall, in conclusion, be allowed such time in making a résumé of the discussion as he may deem necessary. The discussion ended, the Chairman shall close the proceedings with such remarks as he may be pleased to offer.

5. At the close of the concluding remarks of the Chairman, the Society shall go into executive session, as hereinbefore provided, for the transaction of business as follows:

1. Stated business, if there shall be any to be considered.
2. Unfinished business taken up.
3. Reports of officers and committees.
4. Applications for membership reported and voted upon.
5. Correspondence read.
6. Miscellaneous business transacted.
7. New business introduced.
8. Adjournment.

U. S. NAVAL INSTITUTE PROCEEDINGS NO. 213

THE HIGH SEA FLEET AT JUTLAND

By Lieut. Commander H. H. Frost, U. S. Navy

CORRECTION

In Fig. 4 the distance between the *Lion* and the *Lutzow* should be 53 miles at 2.00 p. m. In Fig. 3 the distance between Beatty and Hipper should likewise be 53 miles. As before stated, Fig. 2 was taken from a German sketch, which it was assumed was properly drawn to scale; there is a strong possibility that the German sketch was not drawn to scale, and in this case the screen of light cruisers and destroyers around the German battle cruisers probably covered a greater area than that shown in Fig. 2. Mr. G. J. Hazard, Technical Aide at the Naval War College, very kindly brought the errors in Figs. 3 and 4 to my attention.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Membership Life, regular and associate, 5123. New members, 11. Resignations, 2. Dropped, 221.

Dues The annual dues ($3.00) for the year 1921 are now payable.

Regular and associate members of the U. S. Naval Institute are subjected to the payment of the annual dues until the date of the receipt of their resignation.

Discussions Discussion of articles published in the PROCEEDINGS is cordially invited. Discussions accepted for publication are paid at one-half the rate for original articles, or about $2.25 a page.

Address of Members *All members are urged to keep the Secretary and Treasurer informed of the address to which* PROCEEDINGS *are to be sent, and thus insure their receipt.* Members and subscribers are urged to notify the Secretary and Treasurer promptly of the non-receipt of PROCEEDINGS, in order that tracers may be started. The issue is completed by the 15th of each month.

Book Department The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books, should be considered. The cost will not be greater and sometimes less than when obtained from dealers.

Reprints of Articles The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the Secretary

and Treasurer of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

Illustrations Authors of articles submitted are urged to furnish with their manuscript any illustrations they may have in their possession for such articles. The Institute will gladly co-operate in obtaining such illustrations as may be suggested by authors.

Original photographs of objects and events which may be of interest to our readers are also desired, and members who have opportunities to obtain such photographs are requested to secure them for the Institute.

Notice Whole Nos. 6, 7, 10, 13, 14, 15, 17, 144, 145, 146, 147, 149, 155, 167 and 173 of the PROCEEDINGS are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 75 cents per copy.

ANNAPOLIS, MD., December 15, 1920.

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PROFESSIONAL NOTES

PREPARED BY

LIEUT. COMMANDER H. W. UNDERWOOD, U. S. Navy

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FRANCE

FRANCE'S POST-WAR POLICY.—Député Le Cour Grandmaison, who played a prominent rôle in the last naval debate, and as ex-officer *de vaisseau* may be considered as representing the inward opinion of the French naval service, has done me the kindness of stating at length his views which follow:

"The naval policy is part and consequence of the foreign policy of any country. Now, the political outlook in Europe and elsewhere is not such as to enable France to do without a navy, although to heal her wounds must be her first care. By and by she will be able to devote more attention to her economical and intellectual expansion in the world at large, all things being impossible without a thriving mercantile marine and an adequate *flotte de combat*.

"Therefore the sea claims our immediate attention. We have to meet to-day's requirements and prepare for to-morrow.

To-day the limited naval expenditure must be employed militarily, for a tangible military return. We must go back to the sound principles governing the utilization of navies, and remember that the "*flotte de combat*" is the *raison d'être* of Admiralties, arsenals, and prefectures maritimes, and is the main, the only, thing to consider, and also that it must comprise only '*unités vraiment modernes*' in keeping with Admiral Gervais' precept: '*Un homme fort vaut mieux que deux hommes faibles.*' Consequently, '*tout doit être subordonné à la flotte active,*' and a bona-fide, efficient battle fleet requires to be fully armed and manned all the year round, to have the necessary sea practice and to be thoroughly trained in every respect, *entraînée à fond*. Mercilessly sacrifice all unwarworthy units, that might make illusion on paper, but can only provide in war '*des Good Hope ou des divisions Nebogatov.*' Efficiency resides in superior quality. Strive with every nerve and every *sou* to obtain superior quality rather than mere numbers.

"Similarly, in what regards coast defence, do away with false pretence and make-believe; do not disperse your efforts, but, instead, concentrate them in making Brest, Bizerta, and Toulon truly formidable from both the defensive and offensive standpoint, and strongly organize the Seine, Loire, and Gironde estuaries. No stationary brick-and-mortar policy, but up-to-

date mobile defences, consisting of heavy and quick-firing guns on rail or motor trucks, of torpedo, mining, and aerial flotillas, that can at all times become available where their presence is needed.

"As to new construction, we cannot do better than consult the lessons of past experience. There alone is to be found firm, solid ground, as noted by Admiral Jurien de la Gravière so far back as 1845. Number is not everything; far more vital is it to excel all likely opponents in the designing, constructing, and training of individual warships for action. So much for to-day.

"But we must prepare for to-morrow—that is, for the day when the national prosperity will enable us to have number, besides quality, ever keeping in mind that maritime expansion is not susceptible of improvisation, and that foresight and continuity of views and efforts must without delay pave the way for the recruiting and training of a much-enlarged personnel, and for the rapid and economical construction of up-to-date instruments *d'offensive* of superior power, which will mean unfailing watchfulness and untiring activity on the part of the naval authorities responsible for the Intelligence Department and for constructional progress. The whole naval organization itself must move with the times, since it has for *raison d'être 'l'application, à des situations sans cesse modifiées, des principes immuables de l'art militaire.'* It must be the soul that animates the whole naval body."

The Leygues programme (1918) comprised six scouts of 4900 tons and 12 destroyers. Minister Landry (1920) announced in July last that he would order in 1920-21 six modified *croiseurs légers*, to be second to none of their class, plus 12 super-destroyers, 15 destroyers, and 35 submarines. In August he actually ordered in the state arsenals of Cherbourg and Toulon 11 submersibles of some 1100 tons.

Député de Kerguézec, Rapporteur du Budget de la Marine, who had not enough sarcasm for the policy and inferior *croiseur* of ex-Minister (now Premier) Leygues, has obtained the agreement of the Commission de la Marine and of the Conseil Superieur for the discarding of the modified Leygues programme, which he judiciously holds to be inadequate, as being made up of *"croiseurs et torpilleurs sans vitesse, sans armement, sans protection, et inferieurs aux bateaux similaires etrangers"*—a contention only too well founded.

As a consequence the French naval programme is to include:

(1) A strong *"défense fixe des côtes"* by means of heavy guns and super-cannon;

(2) A powerful aerial fleet;

(3) Two dozen destroyers of superior power and speed;

(4) 100 submersibles *offensifs;*

(5) Super-cruisers, *"extrêment rapides, puissamment armés et fortement protegés";* in short, super-Hoods, fit to tackle any comer on the ocean, capable of commanding respect from enemies and friends alike (and the Section Technique is known to be preparing designs for super-Hawkins at the same time as for battle cruisers, with armaments of 194 and 240 mil.).

The intention is to spend 5,000,000,000 francs within five years to realize this plan which, Monsieur de Kerguezec contends, will enable France *"de regarder l'avenir en face"* (to face all likely eventualities). The Breton député feels humiliated at the remembrance of France's unpreparedness in 1914 and of the timely assistance offered by the supreme British Navy. *"Ces jours de cruelle angoisse"* he does not want to live again.

Truly the naval debate cannot fail to be lively and interesting.—*The Naval and Military Record*, Nov. 17, 1920.

FRANCO-ITALIAN RIVALRY.—There is on the part of those who are framing the French naval programme of to-morrow a tendency to overlook the Italian factor and the requirements of the Mediterranean situation. Thus members of the Conseil Superieur and influential *députés* have just been

making for their own use an interesting picture of the naval world of to-morrow, in which there is no place for Italy; no place, in fact, for continental powers, sea supremacy being destined henceforth to be a bone of contention solely between the United States of America, Great Britain, and Japan, the only rôle of France, besides protecting her coasts, amounting to putting a squadron of six to ten ocean battle cruisers at the disposal of one of the parties when the day of reckoning comes that will decide whether or not Britannia is to retain the trident of Neptune. And it is for ocean duties that the new *croiseurs légers* and submersibles have been designed, whilst the projected *cuirassés*, to mount 450 mil. guns (18-inch), are to be provided with ample radius of action, and to have Brest rather than Bizerta for headquarters.

But despite the official endorsement by the Rome Admiralty of the doctrines of *la jeune école*, the peninsula is not by any means giving up its traditional ambitions on the sea. A recent number of the "*Rassegna Maritimma*" tells us that Mediterranean supremacy belongs by right to Italy, that has inherited the rights and traditions of the Rome, Venice, and Genoa Republics of old, and talented publicists are proclaiming that the time has come for Italy to put into practice the policy recommended by Cavour and Mazzini, viz., "Predominance in the Mediterranean must be the constant thought of Italy, the main preoccupation of its Ministers." This political creed was adopted by the Cabinet of Florence so far back as 1838, though as a matter of fact Napoleon, in creating for his son the kingdom of Italy, stated that "*la première condition d'existence pour la future monarchie Italienne sera d'être une puissance maritime, afin de défendre ses cotes et de maintenir son autorité sur ses îles.*"

As soon as the actual kingdom of Italy had been cemented together, mostly with French blood shed freely at Magenta and Solferino, the vital need of sea power never ceased inspiring journalists and poets. A remarkable work, "Maris Imperium Obtinerdum" (1883), showed how Italy, from its geographical position, lives and dies by the sea, nearly to an equal extent with England, and advocated the construction of a fleet of superior speed, supported by numerous torpedo flotillas. As was pointed out by Admiral di Saint-Bon, defence means defeat for a power with the geographical situation of Italy, which has its finest cities at the mercy of bombardments from the high sea, and, besides, needs safe communications along its coasts to make up for a deficient railway system. In this respect, and when are considered the important islands of Sicily and Sardinia, no European nation is more dependent on the sea, with the exception of Great Britain. But sea power means great financial expenditure, and, of course, the able men, who, like Saint-Bon and Commandant Cottrau, undertook some 40 years since the framing of a policy adapted to the special naval needs of the peninsula, saw from the first the impossibility of competing in numbers with either Great Britain or France. And so they gave up all thought of repeating the experience of Lissa, where a fine Italian fleet was defeated by an Austrian force very much inferior in number and quality; they loathed the very idea of *bataille d'escadre*, and prepared the "war of the poor against the rich, of the fast cruiser against the unwieldy line-of-battleship, of the torpedo against the gun, of isolated encounters and rapid bombardments, something on both the lines of Admiral Aube and Lord Fisher. This noteworthy programme, that was openly aimed at France, was practically realized from 1880 to 1890, when Italy arrayed a fleet including the two 15,000-ton and 18-knot *Lepantos* and the three 14,000-ton and 18-knot *Sardegnas*, superior in speed and caliber to the Toulon squadrons, that comprised a larger number of thickly-armored 10,000-ton ships of 14- and 16-knot speed. In an artillery duel at short range on conventional lines the French would have won; on the other hand, the faster Italian division could have done what it pleased against Gallic shipping, and would have, for a time at least, interrupted communications between France and Algeria. Thus it is no exaggeration to say that, some 30 years since, the

Italians had the mastery of the Mediterranean in their own hands. It was only for a short time. With the completion of the famous Dupuy de Lôme (1891) (6400 tons, 20 knots, 8 guns of 7.6 and 6.5-inch bore, all enclosed in turrets) and of the five smaller Pothuau-Charners of 19 knots, and also of the fine light cruisers of the Surcouf-Descartes classes of 20-21 knots, without mentioning the remarkable *cuirassés* of the Brennus-Jaurréguiberry classes, France regained towards the end of the last century an absolute supremacy over her Latin sister; and since then it has never lost it, at least so far as gun power is concerned. The *cuirassés* of the *Patrie, Danton, Courbet, Bretagne* series were, on the whole, better instruments of offence than their Italian contemporaries of the *Brin, Roma, Dante,* and *Doria* classes, and similarly the 14,000 and 12,700-ton *croiseurs cuirassés* of the Quinet-Ferry types were faster and also better protected than the 10,000-ton Italian armored cruisers of the *Pisa* type, nowithstanding the good points of the latter.

At the same time, there is little to crow about in the present superiority of the Gallic Fleet over the Italian. With half the naval expenditure of France the maritime authorities of the peninsula have got a better return for their money. The contention of the Roman Admiralty in 1919 that the Italian Navy had reached the first rank on the continent caused Frenchmen to smile and shrug their shoulders, and, of course, so far as gun power is concerned, the seven Bretagne-Courbets of 24,000 tons, three of which are armed with 13.4-inch weapons, represent higher value than the five Doria-Cavour-Dantes of Italy. But if speed has really in practice the strategic and tactical importance which many believe, the Italian battle fleet could make good use of the two knots superiority it possesses over the Toulon Armée Navale, when are remembered poor steaming qualities of the Niclausse-boilered ships. In this respect the discarding of the 22-knot quadruple-turret Normandies deprives France of the absolute supremacy in the Mediterranean; and it is also to be noted that the five cruisers France has received from Germany and Austria appear to have been more *"sabotés"* than the war spoils that have rewarded Italy for her belated intervention in the conflict. Meanwhile, and for a few years to come, speed superiority in the Middle Sea will belong to Italy. Against this fact the eloquence of the gentlemen of the Commission de la Marine and the fine programme-making and grand paper reforms that for the last two years have replaced action in the counsels of the navy can, of course, do little.

Happily it is the opinion of not a few naval men that the Mediterranean is a special sea, in which speed can be of no use. Battle-cruisers were rejected in 1912, and again in 1914, for that very reason. In such narrow waters, studded with islands, continuous steaming at 30 knots would be both a risky and expensive pastime, and in the words of the late Monsieur Pelleton, Gallic ratepayers are far too sensible to spend *"l'argent en fumée."* True the *Goeben* and *Breslau* put rather a different complexion on the matter, but then it is rightly observed that in a conflict between France and Italy the aerial factor would have the main say. Lastly, it is added, there is no fear of conflict, France coveting nothing of what Italy has.

Still, history shows that peace is not obtained by begging for it, and that the only safe way to secure it is to enforce it by superior power. The fact has to be faced that Italy is a young, growing nation, who modestly considers the heritage of ancient Rome as her due and national goal. The disruption of the Austrian Empire has only served to open a wider horizon in front of her. Now that she has got rid of her deadly enemy, mostly through French agency, she feels enabled to concentrate her whole efforts on naval expansion. *"L'appétit vient en manageant,"* and France now stands as the only obstacle in the way of the realization of Italian dreams. In this respect the tone of leading journals of the peninsula is significant. In addition to traditional jealousy of France, there is at work the hidden

hand of Bocheland, that has, of course, every interest in fostering discord among the Allies of yesterday. *"Fecit cui prodest."*

Taking it for granted that Italy will not fall a prey to Bolshevism, her naval assets at this stage are worthy of attention. Her human element comprises true seamen and dashing officers, her industrial capabilities are growing, and her geographical position commands both the Central Mediterranean and the routes from Bizerta to France.—*The Naval and Military Record*, Oct. 27, 1920.

THE FINANCIAL POSITION IN FRANCE.—During the past two years every possible fiscal arrangement seems to have been tried in France in the hope of settling upon a policy best suited to the altered conditions of trade and industry. As a means of bringing down the cost of living the free importation of foreign products was at first encouraged, and the result was satisfactory so far as concerned the greater cheapness and abundance of necessaries; but as the rate of exchange continued to advance, and industries were suffering from a lack of work, the growing imports were regarded as an evil and the tendency toward a rigid system of protection became more and more pronounced, even to the extent of absolute prohibition. The immediate effect was to stimulate speculation and give a temporary spurt to business. The final result has been to leave industry in a worse plight than it was before. The present policy aims at ensuring a "balance of trade" by restricting imports and encouraging exports, and, judging from the monthly returns, it would seem as if it were being attended with a certain measure of success; but when it is remembered that the imports consist very largely of fuel and raw material and that the exports comprise manufactured goods which are usually declared for Customs at a greatly appreciated value, the returns make the situation of the export trade appear more satisfactory than it really is.

Meanwhile the rate of exchange continues to be highly unfavorable to France. The question of settling upon some economical scheme for bringing about a normal state of things in all countries suffering from an adverse exchange rate was specially dealt with at the Conference of the League of Nations in Brussels, when the highest expert opinion could see no way out of the difficulty beyond adopting the principle of commercial liberty and stimulating production for export. No European country can live except by an intense industrial activity and by the selling of produce and manufactured goods abroad, and it is obvious there can be no sales by countries which consistently refuse to buy. Before the war France prided herself upon being more or less self-contained, but experience has shown that she cannot live without foreign aid, and the past month has seen the precipitation of an industrial crisis in France that has been in preparation for a long while past. There is nothing radically wrong with the industries themselves except so far as concerns trades like motor car building, which depend largely upon foreign buyers. For the engineering industries generally there is an abundance of work if only the financial situation permitted of its being distributed. A visit to the devastated regions is sufficient to show that there should be no lack of constructive activity, and it is amazing that so little should have been done. It is true that in the manufacturing centers private initiative has brought some of the industries up to about their pre-war production, but the work of reconstruction in the hands of the state has dragged along with desperate slowness. Not only state undertakings, but even private enterprise, is now seriously affected by the financial crisis. The bottom has fallen out of the credit system upon which French business has always been based, for the bankers are very reluctant to discount paper, and when manufacturers have to pay cash for their raw material there are very few who can carry over until they get payments from customers. The only hope for the immediate future, therefore, lies in a revival of credits. Notwithstanding appearances, it cannot be said that France is impoverished. There is cer-

tainly a vast hoarding of money all over the country, but while held in reserve in private hands it does not represent a factor in the national recovery.

The resolution of the Brussels Conference in favor of commercial liberty has made a great impression in France, where the bewildering failures of the many fiscal experiments have left the public mind prepared for any change of a drastic character, and the sooner something is done to facilitate foreign trade the better it will be for the country's future. The state is doing its best to remedy the errors of the past when it issued paper currency without discrimination in the belief that it would be covered by the war indemnity. The new French loan aims at the withdrawal of a considerable quantity of this paper and the constitution of funds for the carrying out of reconstruction work in the devastated regions. This action should help to re-establish credit and will enable the state to pay for work already done and to give out contracts of which the engineering industries are badly in need; but even then it is hardly likely to improve the situation unless the government immediately adopts the recommendation of the Brussels Conference to institute a system of credits abroad whereby foreign firms shall receive bills guaranteed by the government as payment for machinery and other goods supplied to the devastated regions. The guarantee offered will be sufficient to permit of the discounting of these bills, which will be equivalent to cash payments.—*The Engineer*, Nov. 5, 1920.

GERMANY

GERMANY'S THIRD YEAR OF PEACE.—Familiar lamentations over the "harsh and inexorable" Treaty characterize German editorial utterances in the opening weeks of the third year of the "peace of defeat." England alone offered a ray of hope, we are told, in renouncing claims on German property as provided for in the reparation sections of the Treaty, and this decision of hers, says the Berlin *Freiheit*, is of the highest importance because it "makes possible the resumption of commercial relations," and such resumption in itself is so weighty a factor in the whole situation that "it is to be hoped the other Allied and associated governments will follow the example of England." The *Frankfurter Zeitung* suggests that the French would be acting much more sensibly if they imitated rather than criticized England, but "unhappily they see things from a wholly different viewpoint and place the right of might before everything." In bemoaning the Treaty the *Frankfurter Zeitung* declares that when the needs of a people are restricted by "ever new demands and threats . . . . the joy in work and the will to reconstruct are crippled," and one should not be astonished "if disease makes further inroads and the capacity for effort is constantly diminished." This important daily from Germany's great financial center goes on to say that the "strongest giant" must collapse if not allowed the opportunity to recuperate, and reminds us that in the "frightful six years since 1914 the German giant has struggled and shouldered his burden with superhuman endurance." Instead of a solvent state, Germany has become a bankrupt state, according to this authority, and "all that remains to us, apart from German territory which has been mutilated by amputation, is our ability and wish to work and to make good." To do this, it is held, the Germans must have the necessaries of life such as "enough food, houses, and clothes," so that they may possess the needed moral and physical energy to regain their equilibrium. What was bearable in summer is impossible in winter, laments the *Münchener Neuesie Nachrichten*, which declares that to starve and freeze through another winter, "while the shop windows are well filled," requires a command of will-power that no longer exists, and this daily proceeds:

"The income of most families barely permits the purchase of the mere necessities of life. There is no thought of buying clothing and household requisites, and if people doubt this statement, let them inquire in the milk-shops about the many families with children who are unable to buy their

milk-ration. Let them question teachers and school physicians so they may know the terrible malnutrition of our children, and how much they lack in clothing. All money goes for food, so that there is none left for clothes, linen, or shoes. Black despair broods over many families, especially in households that have been used to moderate ease and comfort. Can an old couple live now on the 3000 marks ($45, formerly $750) which constituted a sufficient competence to them in prewar days? Their lives have been ruined by the fall of money values. Thousands who live on annuities or pensions are in utter misery."

The Socialist Berlin *Vorwärts* says "the death-rate in Germany, especially among children, is known to the whole world," and infant mortality in the agricultural districts has reached figures no German would formerly have believed possible. The statistics of a school physician in Saxony show that in Euba two out of 301 children were found to be well fed and in Hertan only five out of 1143.

Among capable foreign observers in Germany there is no tendency to minimize the seriousness of her affairs, but at the same time we do discover a Germany not so hopelessly wrecked and ruined as some of her howlers over the Treaty would have us contemplate. Thus the Berlin correspondent of the London *Times* points out that socially Germany has progressed very considerably since the end of the war. The wave of deep despair that passed over the country was followed by a moral decline in every stratum of society, and its effects are still noticeable. It lasted so long, this informant reports, because of continued political unrest, and it "would not be safe to say that the last has been heard of adventurers who seek short cuts to their goal by methods of violence." The old aristocracy, the landed interests, and the industrialists still profess fear of a "Red" revolution, while, on their side, the working classes murmur a dread of another monarchist *Putsch*. But there are many signs of repair in Germany, and chief among them is "a desire to work." It is doubtful whether crime is more prevalent than it was before the war, but crimes are better advertised, and a false perspective is the result, according to this observer, who continues:

"There has been a decrease in crime since the beginning of the present year. Public morals were never very high in the great German cities, especially Berlin; to-day one would say from casual observation that they are as bad as ever, but not worse. These phenomena probably march with better employment and with a reawakening of the sense of civic duty as the result of a reaction from public disorder.

"In German cities there is always a scum that is driven to the surface by the forces of social intercourse. To-day it is very apparent in Berlin, though not so noticeable in Munich or Hamburg. It is this froth that forces itself upon the observation of the passing traveler, leading him to believe that it is the life of the place.

"One has to look below the surface to see it for what it is, and then one also finds the real stuff. This boiling scum is given off by the profiteer, who is perhaps the greatest social menace threatening Germany to-day. His gains come easily—a hundred thousand marks may perhaps be made over the telephone before lunch by the lucky holder of a few truck-loads of sugar—and they filter down through his parasites to go just as easily. But the restaurants and cabarets of Unter den Linden and the neighboring streets are as a small patch on a city of five millions. They are as nothing in a country of 70 millions, and one must look elsewhere for the real state of things. It is necessary to predicate at this length because shallow deductions are so constantly being drawn from this single feature of German city life. Nevertheless the constant flaunting of superfluous wealth amid amusement and vice has one very evil effect. It tends to prepare the field for the Bolshevik agitator, who is to-day more insolently active in Germany than anywhere else in Europe."

Yet there is a reawakened feeling for industrial and commercial energy among all classes, we are told, and agriculture, "still the largest industry in Germany," is, of course, best off. With the rest of Germany's industries the case is otherwise, and we read:

"Only in a few trades is there any briskness. There is still a great shortage of raw materials for many industries; one hears complaints of a lack of coal, and orders are not coming in from abroad. There is a great demand for increased capital, and it is being called up in millions. This is a necessary outcome of inflation.

"Just as in the moral field there are controversies at work tending to retard recovery, so there are in the province of industry new problems the effect of which is to maintain an atmosphere of unsettlement highly inimical to the resumption of normal trade. One of these is the question of the socialization of the coal-mines. In its present form the demand is a heritage of the general strike that followed upon the Kapp *Putsch;* a measure of socialization was part of the bargain between the trade-union leaders and the government for calling the strike off.

"It has descended, a hopeless heritage, to the present government. It is an embarrassment to the Cabinet and a constant drag on trade. While it hangs over the country it checks enterprise and development of fresh mining adventures, compelling caution where otherwise a bold policy would be dictated.

"Credit does not appear to present any great difficulty. Large firms, of course, are in a specially favored position with the banks, and small firms sometimes have to pay a rather severe rate of interest for accommodation. This matter is shortly to be regulated by the government, but meanwhile there does not seem to be any great outcry. German industry may, in fact, be said to have struggled to its knees. It has been a wonderful effort, and in it the German industrial and mercantile classes have shown all their old skill and persistence. Now it is all a question of winning back the old markets and finding new ones."

At the root of the whole matter of the revival of German trade lies the condition of German finances, we are told:

"The funded debt, which was about 5000 millions of marks in July, 1914, was 91,000 millions on November 1, 1920; and the floating debt, which was 400 millions in July, 1914, was 157,300 millions on November 1, 1920. The total debt is 287,800 millions, and by the end of the financial year it is expected to reach some 330,000 millions.

"But from end to end of Germany you will hardly hear the words 'state bankruptcy' even breathed. The loan interest is paid, the coal deliveries to the Allies are maintained, and thereby the mark continues to maintain a value. As long as it is worth anything or something, trade can go on, and the German merchant can keep a credit in some sort of real money to pay with."—*The Literary Digest,* Dec. 11, 1920.

GERMAN SUBMARINES.—Gives interesting data relative to the German submarines. The number built before and during the war was 568, of which according to Admiral von Capelle, 210 were lost and 183 still under construction.

The cost of building ran up from 4110 marks per ton in 1914 to 9000 in 1918. Captain Persius said 24 or 30 months were required for building an 800-ton boat, but the constructor Schurer says only 100 days sufficed for the first boat of the *UB* type and 7 months for the remainder. From the construction point of view the Entente Powers had nothing to learn. (Commander E. Normand, *La arina Mercantile Italiana,* Sept., 1920.)—*The Technical Review,* Nov. 2, 1920.

GREAT BRITAIN

OUR DWINDLING CAPITAL.—Admiral de Chair's allusion to the rapidity with which the modern battleship or cruiser declines into obsolescence was a timely reminder that this country is living on its captal in the sphere of naval defence. And that capital is not by any means large. Anyone with a knowledge of warship values who scans the navy list to-day will perceive at once how narrow is our lead in ships of the strongest type and how soon we shall fall behind. The public cannot be expected to know the technical niceties of armour, protection, speed, and the other factors by which the tactical value of a modern man-of-war is determined. To them a dreadnought is a dreadnought, irrespective of its age, the caliber of its guns, the thickness and disposition of its armor-plate, or its speed at sea. But the expert naturally finds as much diversity among the world's dreadnoughts as formerly obtained among the pre-dreadnought fleets. It is understood that naval opinion in this country is almost unanimous as to the material elements that qualify a capital ship for inclusion in the first rank. Broadly speaking, those elements are: (1) A main battery of not less than eight guns, with a minimum caliber of 15 inches; (2) for battleships, such armor protection to vitals as will resist the heaviest A. P. Shell at ranges exceeding 12,000 yards, and nearly all-round bulge defence against torpedoes; (3) for battle-cruisers, a sea speed of at least 30 knots. Applying this standard, we find that it rules out all but six ships of the Royal Navy, the survivors being five Royal Sovereigns and one Hood. The five Queen Elizabeths are excluded because they lack bulge protection, though in other respects they are still very fine and formidable ships. The standard may be considered unduly severe, but it is based on actual war experience, and will be reached by at least 24 American and Japanese ships now building or authorized. We do not wish to labor the point, but would commend these figures to the attention of people who are still under the delusion that our lead at sea is assured for several years to come.—*The Naval and Military Record*, Nov. 17, 1920.

A GREAT NAVAL PHILOSOPHER.—It must be gratifying to the British peoples to know that the record of the Life of Mahan (Murray) should be written by one of themselves—one, moreover, who has not plunged into authorship before. Mr. C. Carlisle Taylor, formerly British Vice-Consul at New York, describes his new book as the overflow of an English heart full of admiration for an American who, by force of character, overcame well nigh insuperable obstacles and earned for himself in the eyes of the world the highest distinction yet accorded a naval philosopher. The far-reaching effect of Mahan's work upon the policy of nations is apparent to all. Here is an instance of the impression made by his writings and character upon an individual unconnected with the sea profession.

Passing over the information given about the family and home life of the great American admiral, his exceeding reserve and modesty, and his profound religious convictions, in regard to all of which Mr. Taylor's biography is valuable, the naval officer will find himself considering how far the teaching of Mahan affected the course of events in Europe. Mr. Taylor affirms that there is ample evidence that in the last few months of his life—and it may be recalled that he died after the war had been in progress only four months, on December 1, 1914, the Admiral suffered acute mental distress about the conflict and the part he had played, although entirely unpremeditated, in stimulating the growth of the German Navy, thereby helping to make possible the crime of August, 1914. Of the immense stimulus given to naval expansion in the Fatherland by the "sea power" series, there can be no question. The Kaiser, in a telegram dated May 26, 1894, said, "I am just now, not reading but devouring Captain Mahan's book; and am trying to learn it by heart. . . . . It is on board all my ships and constantly quoted by my captains and officers." The manner

in which the Germans fastened on to this great fact of sea power, and the energy they displayed in expanding their fleet, must have amazed no one more than the quiet philosopher whose writings inspired them.

Two things can at least be said in this regard. Every penny spent upon the navy of Germany was a penny taken from the army. Secondly, when put to the test, that navy proved absolutely useless for its cardinal purpose. The only force which was able to do anything of real consequence in the war was the *U* boat, and even the power of the latter was never admitted and realized until long after hostilities had begun and when its best chance of success had passed. Mahan knew inwardly, moreover, that Germany must fail. He prophesized that submarines would not subjugate battleships, saw that Italy would abandon the Triple Alliance, held that sea power would be the deciding factor, and that the Germany Navy would surrender to the British Fleet; in all these forcasts his judgment was sound. Even more quickly than in Germany was his teaching assimilated by Japan, whose victory in the war with Russia was largely due to it. The author of the new life gives a table showing that in the twenty-five years after the publication of "The Influence of Sea Power upon History" the naval expenditure of the principal nations increased from 38 to 167 millions sterling. This is not, however, an entirely fair criterion, the increased cost of the bigger ships built being largely responsible. Nor can it be said that Mahan's books were the immediate cause of the revival of British naval strength, because Stead's "Truth About the Navy," inspired by Lord Fisher and others, preceded them, and the impetus of public opinion to restore the Fleet had already been given. But Mahan greatly helped the movement by the appeal his writings made to statemen and laymen, and that he captured the national imagination was proved by the remarkable welcome from all classes afforded him when as captain of the *Chicago* he came to England in 1894.—*The Army and Navy Gazette*, Nov. 6, 1920.

UNITED STATES

"TENNESSEE"—OUR LATEST BATTLESHIP.—The battleship *Tennessee* (sister to the *California*) which was laid down at the New York Navy Yard in May, 1917, recently left for a "shaking down" cruise to Guantanamo, Cuba, at the conclusion of which she will be given her speed trials for acceptance by the Navy Department. Her principal dimensions are: length between perpendiculars, 600 feet; beam, 97 feet 3½ inches; mean draft, 30 feet 3 inches; normal displacement, 32,300 tons; and full load displacement with 31 feet of draft, 33,190 tons. Her motive power consists of a Westinghouse turbo-electric drive, with two main generators and four propelling motors. In the boiler room are Babcock and Wilcox oil-fired boilers, and her estimated shaft horse-power is 38,500. The main battery consists of twelve 14-inch, 50-caliber guns which are emplaced in four 3-gun turrets, all of which are mounted on the center line of the ship and are available on either broadside. The secondary battery, which is mounted in casemates on the spar deck, and upon the boat deck, conists of fourteen 5-inch, 51 caliber guns. For anti-aircraft defense there are four 3-inch guns. The *Tennessee* mounts two torpedo tubes, one on each beam, for firing the 21-inch torpedo. The complement of the ship is made up of 130 officers of all ranks, and 1281 men. An unusually large part of the displacement of the ship is given over to armor protection, the belt having a maximum thickness of 14 inches. The funnel bases are heavily armored. The port plates of the turrets are 18 inches in thickness.

A great deal of thought has been given to protecting the ship by limiting the inflow of water below water line, caused by shell fire or torpedo. Between the outer shell of the ship and the engine and boiler rooms, magazines, and other vital elements, there are several longitudinal walls of steel which are intersected by numerous transverse bulkheads. This provides the ship with a wide cellular belt, whose effect will be greatly to limit the

NAVY DEPARTMENT—BUREAU OF CONSTRUCTION AND REPAIR

VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY—DEGREE OF COMPLETION, AS REPORTED NOVEMBER 30, 1920

Type, number and name	Contractor	Per cent of completion			
		Dec. 1, 1920		Nov. 1, 1920	
		Total	On ship	Total	On ship
Battleships					
44 California	Mare Island Navy Yard	94.8	93.7	94.5	93.2
45 Colorado	New York S. B. Cpn.	63.2	58.3	61.3	55.9
46 Maryland	Newport News S. B. & D. D. Co.	86.5	85.5	84.	83.
47 Washington	New York S. B. Cpn.	54.1	45.3	52.7	43.4
48 West Virginia	Newport News S. B. & D. D. Co.	37.7	25.2	35.5	22.5
49 South Dakota	New York Navy Yard	17.6	9.8	16.2	8.
*50 Indiana	New York Navy Yard	13.8	6.	12.8	4.6
51 Montana	Mare Island Navy Yard	15.1	7.3	13.2	6.2
52 North Carolina	Norfolk Navy Yard	18.6	11.3	17.4	10.3
53 Iowa	Newport News S. B. & D. D. Co.	10.9	7.6	9.4	6.6
54 Massachusetts	Beth. S. B. Cpn. (Fore River)	.5	....	....	....
Battle Cruisers					
1 Lexington	Beth. S. B. Cpn. (Fore River)	3.5	.4	3.2	.4
2 Constellation	Newport News S. B. & D. D. Co.	2.6	1.1	2.2	.6
3 Saratoga	New York S. B. Cpn.	8.	4.4	5.8	3.2
4 Ranger	Newport News S. B. & D. D. Co.	.9	.3	.8	.2
5 Constitution	Phila. Navy Yard	1.4	.5	1.2	.4
6 United States	Phila. Navy Yard	1.4	.5	1.2	.4
Scout Cruisers					
4 Omaha	Todd D. D. & Const. Cpn.	81.5	73.9	78.1	68 9
5 Milwaukee	Todd D. D. & Const. Cpn.	71.1	67.7	68.	62.7
6 Cincinnati	Todd D. D. & Const. Cpn.	50.2	35.8	45.8	26.8
7 Raleigh	Beth. S. B. Cpn. (Fore River)	30.2	16.4	23.	12.
8 Detroit	Beth. S. B. Cpn. (Fore River)	28.8	15.	21.4	10.4
9 Richmond	Wm. Cramp & Sons Co.	56.	....	55.	.....
10 Concord	Wm. Cramp & Sons Co.	55.	....	54.	.....
11 Trenton	Wm. Cramp & Sons Co.	34.	....	32.	.....
12 Marblehead	Wm. Cramp & Sons Co.	33.	....	31.	.....
13 Memphis	Wm. Cramp & Sons Co.	26.	....	24.	.....
Miscellaneous					
Fuel Ship No. 18, Pecos	Boston Navy Yard	47.	44.	42.5	39.
Gunboat No. 22, Tulsa	Charleston Navy Yard	41.8	28.1	37.1	25.3
Hospital Ship No. 1, Relief	Phila. Navy Yard	99.4	99.2	99.	98.8
Amm. Ship No. 2, Nitro	Puget Sound Navy Yard	99.6	98.5	99.4	98.2
Rep. Ship No. 1, Medusa	Puget Sound Navy Yard	45.8	35.6	42.7	32.
Destroyer Tender No. 3, Dobbin	Phila. Navy Yard	41.4	41.	36.5	36.
Dest. Tender No. 4, Whitney	Boston Navy Yard	6.5	2.5	5.	2.
Sub. Tender No. 3, Holland	Puget Sound Navy Yard	8.6	....	7.5	....
Aircraft Tender, Wright	Tietjen & Lang	*13.	....	65.	....

*Battleship No. 50, keel laid November 1, 1920.

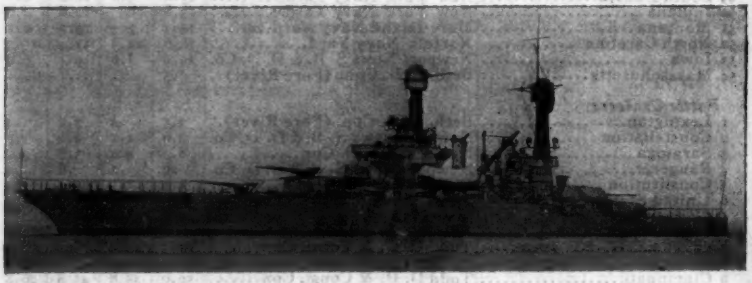
In addition to the above there are under construction 39 destroyers, 47 submarines, and 2 sea-going tugs. Authorized but not under construction or contract, 12 destroyers, 7 submarines and one transport.

There were delivered to the Navy Department during November, 6 destroyers.

flooding which results from the successful blow of a torpedo. Also, the vitals of the ship are protected from shell fire by several stout steel decks which, it is hoped, will serve as shell bursters and by breaking up the shells prevent any penetration below the protective deck.

During the service of our Sixth Battle Squadron with the Grand Fleet in the North Sea, there was a very free exchange of ideas between our own and the British navies, as there was also between the various departments of the two navies, and when our squadron returned to this port they presented to American eyes several new features which they had brought with them from the area of naval operations. Several of these features have been embodied in the *Tennessee,* with many improvements worked out in our own department. Among our own developments is the large enclosed structure at the mastheads which takes the place of the old, open, fire-control platforms as they were known in our navy in prewar days. These enclosed "tops" were necessitated by the improvements in director firing, in which the aiming of the guns is controlled by officers stationed in lofty positions and preferably at the masthead.

In no direction has there been such progress as in this matter of gunnery. Both in the British and in our own navies some really wonderful



OUR LATEST BATTLESHIP "TENNESSEE," LEAVING NEW YORK FOR A SHAKING-DOWN TRIP, PREPARATORY TO HER TRIALS.

Length, between perpendiculars, 600 feet; 97 feet 3½ inches; draft, 30 feet 3 inches; displacement, 32,300 tons. Motive-power, Electric-drive. Horsepower, 38,500. Battery, twelve 14-inch in four 3-gun turrets, fourteen 5-inch. Armor, belt, 14 inches; turrets, 18 inches; complement, 1411 officers and men.

instruments have been devised for finding the range and bearing of the enemy and keeping on the range in spite of the deviation of one's own or the enemy ship. Among these may be mentioned range-finding instruments, target bearing instruments, and those for range keeping; and, of course, there is the form of telescope known as the directorscope. It has become necessary to give ample protection both to these instruments and the officers and men who operate them. This accounts for the remarkable double-deck structure which is such a conspicuous feature at the head of each of the lattice masts of the *Tennessee.* It will be noticed, by the way, that these masts are very much more massive in construction than those of our earlier ships. This change is due to the necessity of damping out as quickly as possible the intense vibrations which are set up in the structure of a battleship and particularly at the mastheads, when a salvo from its big guns is fired. Also, it is desirable to reduce to a minimum a certain amount of springing of the masts, due to inertia when the ship is rolling or plunging heavily. The British use a combination of three very stout steel masts arranged in tripod form. Doubtless, this gives a stiffer plat-

form; but in the opinion of our Navy Department, the tripod mast could be more easily shot away or seriously disabled than our lattice masts, which are made up of a very large number of spirally grouped steel tubes.

Another development of the war is the use of director firing, not merely for the main battery, but also for the 5-inch torpedo battery. These, of course, have to be separate installations and hence we have the two separate director rooms, one above the other.

Another conspicuous feature which will be new to American eyes is the large clock face at the front of the foremast. This is a British device which gave satisfaction. It is used when a fleet is steaming in column to indicate to the ship ahead and the ship behind (there is another clock on the rear of the main mast) the speed at which the ship is traveling—a necessary precaution in keeping proper distance and station. At the foot of the foremast and some distance ahead of it is a large covered range-finder, and below this is the navigating bridge. Below the bridge where we see the circular port holes is the chart house which is surrounded by the signal bridge. A group of signal men will be noticed in the right-hand corner of this bridge, with the racks for the signal flags behind them, and the signal halyards leading up to the signal yard at the top of the mast. Forward on this bridge will be noticed the top of the conning tower.

The *Tennessee* and *California* are the last ships that we shall build carrying the 14-inch gun. The next class, consisting of four vessels, the *Colorado, Maryland, Washington* and *West Virginia,* will be about 1000 tons larger than the *Tennessee;* but otherwise, so far as general appearance is concerned, will resemble her. The principal difference will be that eight 16-inch guns will take the place of twelve 14-inch guns, and that a great weight of protective armor will be employed.—*The Scientific American,* Nov. 13, 1920.

MERCHANT MARINE

THE LABOR QUESTION AND THE MERCHANT MARINE.—The question of labor, so far as the shipping trade is involved, applies most directly to the manning and officering, victualling, loading and discharging of the ship itself. Indirectly, of course, the trade is affected by nearly all labor conditions, from the crews of towboats in seaports, to the wages of farm hands in Ekaterinoslav, Russia, or wool packers in Woolloomooloo, Australia. So far as this latter feature is concerned, we pass it for the present.

The matters of loading and discharging, harbor charges and port expenses in general, do not affect ships of one nationality differently from those of others. Foreign ships in our own ports receive approximately the same treatment as our own; and the converse is broadly true of our own ships in foreign ports. Stevedores, for instance, make the same rates for English as for American ships in the port of New York, and expenses in general are the same. Conversely, American ships trading to the great ports of Europe stand on about the same basis as any other nationals. And this is true in the most important trade routes of the world from Norway to Australia. There are some ports and some small matters in which there is discrimination, but we need not enter into these for our present purpose. Where such differences exist they are mostly for purposes of raising revenue, rather than protective, and generally any protective result is incidental and not very important.

We will, therefore, consider for the moment only the cost of manning, officering and victualling ships, and compare such costs in the case of American ships, with those of our chief competitors.

The figures used are based upon the data of the American Steamship Owners' Association—and compare crew lists and wages for a ship of 8800 tons total deadweight capacity on the respective basis of American, English, Norwegian and Japanese scales. The actual figures are as of the summer of 1919, but as the relative costs have not greatly altered in the

interim these figures (though not exact) should be sufficiently so for any use that we shall make of them.

In brief detail the comparison is as follows:

Comparative wages of Department Chiefs:

	American	English	Norwegian	Japanese
Master's salary	$357.50	$258.00	$268.00	$255.00
Chief Engineer	332.50	233.00	221.00	220.00
Chief Steward	135.00	97.00	156.00	35.00
	$825.00	$588.00	$645.00	$510.00

The above illustrates the differences in apparent wages of the chief officers in the three main departments of a ship's operation. But it is fallacious in one vital respect. It reckons all currencies at the normal rate of exchange and makes no allowance for the fact that only two nations out of the four pay their wages in gold; the other two pay in depreciated paper. Our own country is on a gold basis, and pays seamen in gold or its equivalent. England and Norway pay their seamen in paper, which is to-day at a heavy discount as compared with gold.

Specifically the gold value of a Norwegian kroner is 26 cents and Norwegian paper currency can be bought in this market at around $13.80 per 100 kroner. Sterling has been around $3.40 to the pound as against a par value of $4.8665.

Therefore the par rate of exchange for Norwegian and English exchange used in the above comparison is misleading. The English ship figures say £121 sterling; and the Norwegian say 2481 kronen. At current rates of exchange the comparison would, therefore, stand thus:

Comparative wages in gold of Department Chiefs:

American	English	Norwegian	Japanese
$825.00	$411.40	$342.38	$510.00

The following will indicate the relation of wages in two departments (all in terms of U. S. gold):

	American	English	Norwegian	Japanese
Able seamen	$85.00	$48.96	$27.69	$31.00
Oilers	95.00	52.46		48.00
Coal passers	75.00	48.96	26.02	25.00

Figuring the total crew and wage lists at present gold values of the different currencies, the comparison works out as follows:

	Total Crew	Total Cost	Per Captain
American ship	48	$5,315.00	$110.73
British ship	45	2,750.00	61.11
Norwegian ship	40	1,794.00	44.85
Japanese ship	59	2,869.00	48.47

So far as British and Norwegian ships are concerned, the value of comparisons is, no doubt, clouded by the unusual relation of those currencies to gold. With more normal rates of exchange, the differences as compared with the American gold scale would be narrowed, though not eliminated.

At normal rates of English and Norwegian exchange (the pound at $4.86; and the kroner at 26 cents, the following results will be shown:

American	48 men, total cost	$5,315.00	
British	45 " " "	3,924.00	per cent. of Am. 74
Japanese	59 " " "	2,869.00	" " " " 54
Norwegian	40 " " "	3,378.00	" " " " 64

but normal rates of exchange seem a long way off at the moment, and our competition to-day is not only with a lower scale, but with cheaper currencies.

Japanese currency is, however, on a gold basis and a fair comparison as to wages, and subsistence may, therefore, be made. Subsistence on American ships to-day will run about $1.25 a man per diem or $37.50 a month, including all ranks from messboy to captain. On the same basis Japanese subsistence does not exceed 50 cents a man per diem or $15 a month, according to the best information obtainable.

Our theoretical ship of 8800 tons, therefore, spends for subsistence as follows:

Under American Registry, 48 men at $37.50 a month.....$1,800.00
" Japanese " 59 " " 15.00 " " 885.00

Basing the comparison on the figures already arrived at, we reach the following results:

Comparison of wages and subsistence:

	Wages	Subsistence	Total
Japanese	$2,869.00	$ 885.00	$3,754.00
American	5,315.00	1,800.00	7,115.00

a difference of $3361.00 a month on these two items; or say an American handicap of $40,332 per annum. This would figure out $4.46 a ton of total deadweight capacity, or (say) $5.76 a ton of cargo carried. Based on five voyages per annum the difference in favor of Japanese register would be about $1.15 a ton of cargo carried a voyage, or say $8000 a voyage.

This much is obvious and easy to calculate. The larger factor, which it is not possible to state exactly in figures, involves the question of the comparative living scales of workers directly tributary to the business of shipping. It would be easy to tabulate a mass of figures concerning this matter, but it is doubtful whether such statistics would be profitable to us. The main points in such a comparison, however, stand out rather clearly. It may be assumed that the relative differences (in terms of equal exchange—that is to say, in gold) which mark the two costs of labor and subsistence will apply, measurably, to costs of labor directly employed in building, equipping, repairing, maintaining, and operating the ships from the shore end.

This, as stated, is only a general consideration, and we shall not attempt to estimate exactly the differences in cost of ship operation, due to the difference in the entire level of land wages, as applied to the two nations. But it is at least reasonable to assume that as a minimum, the differences caused by all other contributory labor factors will be approximately equal to the difference in wages and operation. This would about double the advantage of the Japanese ship as compared with the American and on a ship of this size, namely, 8800 tons total capacity, would indicate an advantage to the Japanese ship of $80.000 per annum, or, based on five voyages, $16,000 a voyage.—*The Nautical Gazette*, Nov., 1920.

BRITISH AND AMERICAN SHIPBUILDING.—It is satisfactory to note from the valuable shipbuilding statistics issued by Lloyd's Register of Shipping on October 19, and published elsewhere in the present issue, that the increased share of new mercantile tonnage production once more secured by British shipbuilders after the conclusion of the war has been more than maintained during the quarter ended September 30, 1920. At June 30, last there was under under construction throughout the world merchant shipping of a gross tonnage of 7,720,904, of which 3,578,153 tons (46.3 per cent) were building in the United Kingdom, while the British Colonies and all foreign countries had in hand 4,142,751 tons, or 53.7 per cent. Three months later—at September 30—the corresponding figures were:

The world ..... 7,565,171 gross tons.
United Kingdom ..... 3,731,098, or 49.3%
Other countries ..... 3,834,073, or 50.7%

It will thus be seen that, while during the three months the merchant shipping under construction in the United Kingdom increased by 152,945 tons gross, foreign shipbuilding (excluding German) diminished by 308,678 tons. Figures from Germany are not yet available.

On the other hand, British shipbuilders have still some lost ground to recover before they once more occupy the same favorable position as they had prior to the war; since at June 30, 1914 (a little over a month before the commencement of hostilities, the merchant shipping under construction was as follows:

The world	3,162,890	gross tons.
United Kingdom	1,722,124,	or 54.4%
Other countries	1,440,766,	or 45.6%

The world's total at September 30, 1920—7,565,171 gross tons—is 155,733 tons lower than the figures at June 30, 1920, and 483,411 tons lower than the record figures reached at the end of September, 1919, but 4,402,281 tons higher than the total at June 30, 1914.

As regards the United States, an enormous decrease has taken place in the tonnage under construction in that country during the last 18 months. At March 31, 1919, 4,185,523 tons gross were actually building there; whereas at September 30, 1920, the tonnage building had fallen to 1,772,193, a decrease of 57.7 per cent. In the United Kingdom during the same period the figures increased from 2,254,845 tons to the present record total of 3,731,098 tons, an increase of 65.5 per cent. An analysis of the 312 vessels of 1,772,193 tons gross building in the United States at September 30, 1920, is given in Table I.

TABLE I.—SHIPS BUILDING IN THE UNITED STATES

	Steamers and motor vessels		Sailing vessels	
	Steel	Wood	Steel	Wood
Atlantic Coast	1,229,017	1,500	4,354	6,000
Gulf Ports	141,553	8,560	—	5,400
Pacific Coast	331,150	8,450	—	2,500
Great Lakes	33,709	—	—	—

—*The Shipbuilder*, Nov., 1920.

MAKING PASSENGER VESSELS FROM OUR OLD DESTROYERS.—The recent offering for sale by the navy of three gunboats and two cruisers brings to mind the fact that recently the New London Ship & Engine Co., of Croton, Conn., a subsidiary of the Submarine Boat Corporation, bought from the navy, four destroyers, each about 10 years old, with the idea of converting them into passenger vessels. It is understood, however, that the plan was not regarded feasible in view of the construction of the ships and, although the shortage of passenger ships still exists, the matter has been held in abeyance.

Outboard and inboard profiles prepared in connection with the alteration plans show the good appearance these vessels would make as converted passenger ships and also what an efficient arrangement could be worked out, using the vessels on a night run. An arrangement was also worked out for a day run where the passengers would not remain on board over night and the reduction in crew accordingly would permit additional space for passengers and larger public spaces. The sea-going qualities of these destroyers was reported as being excellent and this was demonstrated while they were on duty in the North Sea during the war.

The arrangement for a night run contemplated installing 18 state rooms on the main deck and 27 on the lower deck, providing for 90 passengers, two in a room. In addition on the main deck there were to be the main saloon, smoking room, toilets, crews' galley and messroom, steward's and

purser's office, and the chief engineer's and assistant engineers' and pursers' staterooms.

Crew's quarters were to be on the lower deck, with the dining-room, galley and pantry, stewardesses' room and baggage room in the extreme stern. On the upper deck the pilot house, captain's and mates' staterooms, and radio house were to be installed.

The arrangement for a day run contemplated comparatively few staterooms, the public spaces, officers' and crew's quarters being made considerably larger.

These destroyers were fitted with water-tube boilers and steam turbines, and it was proposed to remove them and install Nelseco Diesel engines. This would eliminate the fire-room force and also reduce the engine-room force which, together with removal of boilers, would provide more space. The reduction in crew and the use of Diesel engines would naturally speak for economical operation. Three 1000 horsepower engines could be installed giving a speed of 21.2 knots; however, in view of the higher cost of operation at this speed, it was recommended that engines be fitted giving a speed ranging between 15 to 18 knots.

The steering gear, windlass and generator were to be operated by a donkey boiler fitted in the forward end of the engine-room. In the forward hold there were to be trimming tanks, chain locker and fresh water tank, and in the after hold trimming tanks and engine stores. Fuel oil tanks, feed water tank, galley storeroom and cold storage space was to be amidships in the hold.

The overall length of these hulls is 203 feet 10 inches, beam 26 feet, depth 16 feet 4 inches, drawing about 8 feet of water and displacing about 700 tons. The length of the raised forecastle is 73 feet, giving a freeboard forward of about 17 feet.—*The Nautical Gazette*, Nov. 13, 1920.

JAPAN

"IF AMERICA AND JAPAN WENT TO WAR"—A JAPANESE VIEW.—Lieut.-Gen. Kojiro Sato, of the Japanese Army, is giving serious thought to a possible war in which Japan will be matched against America. He is the author of a series of articles in a Tokyo newspaper, *Hochi*, in which he gravely discusses the possibility of an American invasion. Supposing America invaded Japan, he gets some comfort out of his remarkable idea that "the American troops, unaccustomed to warfare in hilly country, would find the greatest difficulty in resisting the Japanese." Both Guam and the Philippines furnish possible naval bases, he points out, for an American attack on the Japanese nation, but these islands would be so liable to attack by the Japanese Navy that he believes America would hesitate. "Putting Japan in the place of America, she would not shrink from waging war in the face of these difficulties," he observes. "But I do not think that America can summon up the courage to disregard these obstacles and think of sending an expedition to a country so far removed from her as Japan." Thus the conclusion of the article is pacific, even if the grounds are not altogether complimentary to American valor.

The Japanese general is quoted in the Peking *Daily News*, which is no friend of Japanese militarism, and doubtless makes the most of the Japanese Bernhardi, whom it seems to have discovered in the person of General Sato. To quote from *The News'* translation of one of the General's recent articles:

"When America's program of naval extension is completed, she will have 40 old and new battleships, 37 cruisers, 258 torpedo destroyers, more than 300 submarines, and 5000 seaplanes. There will be a corresponding increase in the mercantile shipping, which, on the completion of the plans now under way, will enable America to put in commission 1039 ships of various descriptions, totaling 5,924,700 tons. America had an army of 120,000 men in pre-war days, but it is contemplated to increase the forces to

300,000 at a bound. While she is thus striving to augment her national defence, America is steadily going on with the scheme of giving military training to 650,000 young men of military age every year. Looking at the American preparedness as indicated in the circumstances above mentioned, one is apt to come to the conclusion that Japan is no match for America in point of military strength.

"But what was the result of the battle of Bunei? At the sight of Genghis Khan, who had carried everything before him in Europe, most of the observers here dwelt on the necessity of taking precautionary measures against emergencies arising from the ambition of the Mongolian chieftain. Kublai Khan, who had succeeded in his plan of world-conquest, had brought under his control the Chinese continent, and had turned to us to satisfy his insatiable territorial greed. Japan was in a far less advantageous position from a military point of view than she is now as against America. And yet the result of the conflict ended in victory for Japan. In considering the causes of Japan's victory in this battle, some observers attribute them to the invisible help of Providence, but these observers clearly reveal their ignorance of the condition in which Japan was at that time. How Japan, in order to stem the crushing force of Kublai Khan, endeavored to strengthen her defense and armaments, can be seen by inspection of the historic remains. Suppose that Japan had had no Tokimune, the attitude of Japan toward Kublai Khan would have been swayed by the negative policy of the authorities, and her territory would have passed under the control of China.

"History repeats itself. In the era of Ansei, Japan was confronted with a similar danger from outside, and in this conflict Japan, notwithstanding innumerable difficulties, ultimately gained the day. If there was anything that contributed to the victories over foreign enemies, it was the spirit of bravery. Japan is now face to face with a menace from America. Have the Japanese the courage to brave the situation—the courage which helped their fathers to frustrate the efforts of foreign countries to subdue Japan in past times? It is my settled conviction that if Japan to-day had such great men as Tokimune, Saigo, Ckubo, or Kido, to inspire the flagging spirit of the people, I have no doubt they would be able to show a united front to the enemy.

"We hear sometimes that the Japanese were never more devoid of manly and chivalrous spirit than to-day, and that, considering the state of the public mind, it is doubtful whether the Japanese of to-day are capable of rising to the occasion. But these misgivings will be found groundless in consideration of the condition of society in those days when Japan was menaced by Mongolians. Needless to say, the present-day Japan has much need for a great man, but there is another means of arousing the public opinion in regard to Japan's attitude toward America. If an appeal is made to the loyalty of the people, I have no doubt that the same degree of patriotism which was aroused by the Nikoliaevsk affair will be shown in regard to the menace from America."

From the middle of the Hojo era down to the closing days of the Shogunate, the general observes, Japan was reduced to a very precarious position, viewed from the point of view of foreign politics, but the fact that foreign countries did not attempt anything in the way of conquering Japan was due to its geographical position as well as to the bravery of its people. He goes on:

"Although the Japanese of to-day cannot be esteemed braver than their forefathers, they have not yet lost entirely the virtue of courage, which is inherent in the Yamato race. As for the geographical position of Japan, she is as difficult of access as ever. Even if Japan had no navy, it is highly improbable that any foreign country could land troops on her shores, however strong that foreign country might be. Again supposing that a foreign country succeeded in invading Japan, all classes of the people, young and old, would unite against the invaders, and it is unthinkable that the invading

troops could be able to hold the conquered territory for any length of time. Unaccustomed to warfare in hilly country, the American troops (supposing America invaded Japan) would find the greatest difficulty in resisting the Japanese, and it is probable that they would ultimately be compelled to evacuate the occupied territory by the almost insuperable difficulties attending the transportation of ammunitions.

"Although the Japanese Navy is inferior to the American, America would find it an absolute impossibility to land her troops in any part of the Japanese territory, so long as there exists the Japanese Navy. Even if America possessed the greatest navy in the world, she would not think of conquering Japan. As long as there remains the last man in this land ready to lay down his life for his country, the American Navy, however strong, would have little chance of possessing any part of Japan. Moreover, if America proposed to attack Japan, she must first have some suitable naval bases from which to carry on operations. America has, indeed, Hawaii, Guam, and the Philippines, but there is much room to doubt the value of these islands as naval bases to attack Japan.

"Guam is a land which is highly suitable in some respects for a naval base to carry on naval operations against Japan, but its harbor cannot accommodate a larger squadron than eight or nine large ships, and what makes that island more undesirable is that as the hills surrounding the port are low in height, it is exposed to fire from the sea. The Philippines have many decided advantages over Guam, but they also would not constitute ideal bases, in that the communications with these islands are liable to be attacked by the Japanese Navy. Putting Japan in the place of America, she would not shrink from waging war in the face of these difficulties; but I do not think that America can summon up the courage to disregard these obstacles, and think of sending an expedition to a country so far removed from her as Japan.—*Literary Digest*, Dec. 11, 1920.

PROPOSED JAPANESE SHIP MERGERS INTO TWO GROUPS.—The question of amalgamating the leading steamship companies of Japan is being actively discussed there.

When a representative of *The Nautical Gazette* entered the office of the head of one of the local Japanese steamship lines a few days ago he found this official reading the latest issues received here of the *Kaisho Tsuho*, of Tokyo, and the *Kaidi Kidi*, of Osaka, both well-known marine publications.

The publications, said the Japanese manager, were full of news of the suggested merger and he explained how the proposal had arisen. It originated with S. Wahamiya, Secretary of Marine in the Japanese Government and a man to whose views great weight is attached in Japan.

"When Secretary Wahamiya makes suggestions," said this Japanese official, "it is the duty of the Japanese companies to give them careful consideration. This is being done at the present time, but I do not think that Secretary Wahamiya is now as enthusiastic about the proposal as he was when he made it. He sees now that there are serious difficulties in the way of amalgamation and disproportionate conflicting interests to be reconciled.

"It is, of course, desirable to effect economies and avoid waste and duplication. Mr. Wahamiya, I think, has observed that British shipping companies and other foreign companies have undergone a considerable degree of amalgamation, and no doubt he thinks that some amount of amalgamation would be a good thing for Japanese shipping also. But I am afraid he has approached the matter in rather an academic or theoretical way. So far he has not worked out any definite, concrete plan."

From another well-posted Japanese official it was asserted that if an amalgamation takes place at all it will most probably result in the formation of two distinct groups. One of these would embrace the Nippon Yusen Kaisha of Tokyo and the Kokusai Kisen Kaisha of Kobe, while

the other would consist of the Toyo Kisen Kaisha and the Osaka Shosen Kaisha.

Each group, it will be noted, includes a large passenger line and a line chiefly or wholly engaged in cargo-carrying.

The Nippon and the Osaka companies have important European connections, while the chief run of the Toyo is from Japan to San Francisco and thence down to South America. The Kokusai is a combination of shipbuilders and shipowners who, after the armistice, entered into an alliance. There are many fine cargo boats in the Kokusai and they are being extensively employed in carrying bulk cargoes. The big shipping and trading firm of Suzuki & Co. is the Kokusai's New York agent.

There is little doubt in the minds of American steamship men that the American Merchant Marine Act has something to do with the proposed Japanese amalgamations. With the discriminations of the Jones Act looming ahead, coupled with a period of lower freight rates and keener competition, it is believed that the Japanese Government, whose views go a long way, desires the Japanese lines to prepare for a rainy day.

Hitherto there has been a good deal of competition among the Japanese lines themselves, as well as between the latter and such foreign competitors as the Blue Funnel Line, Canadian Pacific Ocean Services, Pacific Mail, and latterly the companies operating Shipping Board tonnage on the Pacific. With the advent of the Shipping Board's passenger liners to the Pacific in the near future to be operated by the Pacific Mail and the Pacific S. S. Co., this competition will be enhanced.

One view put forward here is that if the Japanese find themselves seriously affected by discriminations, they might concentrate on South American rather than on North American connections and strive to take as big a part as possible in foreign trade there.—*The Nautical Gazette*, Nov. 20, 1920.

NOTE.—Subsequent information indicates that this proposed merger has fallen through.

AERONAUTICS

THE USES OF HELIUM.—The production of helium on an extensive scale which began during the war, when it was proposed to use this gas for filling balloons and dirigibles, has led to considerable discussion as to other ways in which helium can be used. Prof. J. C. McLennan deals at length with this question in a lecture, published in *Nature*. It appears, in the first place, that if helium is used for filling airships the supply from the British Empire would be far from adequate for the British Air Fleet. One way of economizing it, would be to use it only in compartments adjacent to the engines. As to various industrial uses, it may be used as a filling for thermionic amplifying valves of the ionization type; also for filling tungsten incandescent lamps, especially for signal purposes where rapid dimming is essential, and for producing gas arc lamps in which tungsten terminals are used. Some objections to these uses are pointed out. Nutting has shown that Geissler tubes filled with helium are very suitable, under certain conditions, for light standards in spectrophotometry. Helium is also invaluable in spectroscopy, and for various other laboratory uses. Elihu Thomson has suggested that if divers were supplied with a mixture of oxygen and helium, the rate of expulsion of carbon dioxide from the lungs might be increased, and thus the period of submergence might be considerably lengthened. The widest application of helium, however, appears to be in the field of low temperature research, as liquid helium—and perhaps eventually solid helium—enables one to reach the lowest temperatures attainable by any means. A point of special importance to which Professor McLennan calls attention is that the supplies of natural gas from which helium can be extracted are being rapidly used up; hence it might be well to store a supply of this gas for use in years to come.—*The Scientific American*, Nov. 13, 1920.

A NATIONAL AVIATION POLICY.—Aviation activites during the war were concentrated on the development and production of military aircraft. The selection of the landing fields that were established was necessarily guided by military considerations. The close of the war found us with an aeronautic industry at the stage of quantity production, a large amount of aircraft material on hand, a large number of trained flyers, and a few scattered landing fields. In brief, all this constituted the national inheritance from the investment of hundreds of millions of dollars for the hurried development of military aviation during the war. In the two years that have elapsed since the armistice a good proportion of the aircraft material has become obsolete. A majority of the technical personnel and trained flyers have returned to civil life and to pursuits not connected with aviation. The great aircraft industry has almost disappeared, and some of the landing fields have been surrendered. Those that have been retained really represent one of the most valuable physical assets salvaged from our aircraft expenditures.

As a nation we must seek to realize clearly the lessons of the war and to profit by them. Our efforts in the development of a military air force and the organization of an aircraft industry during the war were remarkable accomplishments in themselves, but the handicap of a negligible industry at the outbreak of the war and the general lack of technical knowledge were too great to be satisfactorily overcome in a short time, regardless of the money available. It is now our clear duty to take to heart the lessons and mistakes of the war period and to shape a national aviation policy that will be productive of the greatest possible structural development consistent with prudent economy.

The government agencies actively concerned with the use of aviation at the present time are the Army Air Service, the Naval Air Service, and the Postal Air Service. Other agencies such as the Geological Survey, the Coast and Geodetic Survey, the Forest Service, etc., have more or less need for the use of aircraft in their work. The National Advisory Committee for Aeronautics is concerned not so much with the promotion of the uses of aviation as with the scienific study of the problems involved and the technical development of the art for the benefit of governmental agencies and of the public generally, but the committee believes that the use of aircraft by the various governmental agencies should be encouraged where its efficient use is practicable; also that the general development of aviation for all purposes should be encouraged by the national government. The faithful performance of our national duties in these respects becomes compelling from considerations of wise military preparedness.

In time or war aviation will probably be the first arm of offense and defence to come into action. For this there must be an established industry and a trained and active air service. Aerial supremacy at the outset of hostilities would be a tremendous military advantage. Ultimate victory would unquestionably incline to the side that could establish and maintain supremacy in the air. Huge expenditures of money in time of danger and frantic efforts to train personnel and to develop hastily an aircraft industry from almost nothing will not do. There must be wise preparedness; there must be in healthy existence at least a nucleus of an industry capable of adequate expansion; there must exist civil and commercial aeronautical activities in all parts of the country which would be the main support of the industry in time of peace. In pure self-defence the government must encourage the development of commercial aviation. The alternative proposition is the creation and maintenance of a powerful standing military air service relatively self-reliant in time of war. We cannot, however, afford the expense which such a policy would entail, and there would be no advantage in time of peace from such expenditures comparable in any way to the advantages to be gained from the support of civil aviation. We should maintain an active air service in time of peace, which should possess inherent strength and be something more than a mere nucleus for expansion in time of war. In the final analysis, however, we must depend

upon civil aviation to furnish a military reserve force. The remarkable accomplishments of our Motor Transport Service during the war were only made possible by the healthy condition of our automobile industry. The problem is to place our aircraft industry in a healthy condition, and to do this we must enter without delay upon a sane, sound policy for the development of civil aviation. The relative cost of fostering an organized plan to develop commercial aviation would be much less than the waste that would inevitably result from unprepared entry into war. Aside from military considerations, the fostering of commercial aviation would in time yield adequate returns in itself in the form of promoting and strengthening our means of transportation, advancing the progress of civilization, and increasing the national wealth.

Aviation is a distinct advance in civilization given to the world by America. The importance of the development of aviation from a military standpoint was not fully appreciated before the war, with the consequent lack of encouragement of the development of the art. The handicap of years of comparative inactivity has not yet been overcome. We cannot afford to repeat the mistakes of the past. We cannot go backward, but must go forward with the intelligent development of aviation in all its branches.

Aviation is still in its infancy; its possibilities, while unknown, appeal to the imagination. The forced development during the war and some of the experimental development since have not been based upon scientific research and sound scientific principles that make for substantial progress. Technical training is necessary, including education in advanced aeronautical engineering, so is the actual training of a large body of men in the technique of the care and operation of aircraft. Broadly speaking, scientific research, technical training, and commercial aviation constitute, or should constitute, the backbone of a national policy.

Reducing to definite form the steps which in the opinion of the National Advisory Committee for Aeronautics are wise and timely, the committee, after careful consideration of all the facts within its knowledge, submits the following specific recommendations:

First. That legislation be enacted providing for federal regulation of commercial air navigation, licensing of pilots, aircraft, landing fields, etc. At the present time there is no authority of law for any executive agency of the government to perform such duties. The committee believes that for the executive administration of these new duties of government there should be established in the Department of Commerce a bureau of aeronautics in charge of a commissioner of air navigation, who should also become a member of the National Advisory Committee for Aeronautics. Acting in cooperation with the War, Navy, and Post Office Departments, the committee has prepared a draft of legislation which appears in full in a preceding section of this report under the heading "Organization of Governmental Activities in Aeronautics," and which it strongly recommends for the immediate consideration of Congress. In this connection the committee recommends also the adoption of a policy of federal aid to the states in the establishment of landing fields for general use in every state in the union.

Second. That the Congress authorize an American airplane competition in order to stimulate private endeavor in the development of new and improved designs of aircraft, the competition to be under the direction of the National Advisory Committee for Aeronautics, the entries of the successful competitors to be purchased by the government at a predetermined and announced figure and made available for the use of the Postal Air Service.

Third. That adequate appropriations be made for the military and naval air services in order to permit the continuous development of these exceedingly important arms of the two services, and to enable them to place orders in such a way as to maintain a nucleus of an aircraft industry capable of

sufficient expansion to meet military needs in time of emergency. The committee considers this absolutely essential.

Fourth. That the control of naval activities in aeronautics be centralized under a naval bureau of aeronautics in charge of a director of naval aviation. At the present time responsibility for the development of naval aviation is divided between the Office of Operations and the numerous bureaus of the Navy Department. This basis of organization does not permit full cooperation with the Army Air Service or with other governmental and civil agencies, nor does it, in the opinion of the committee, promote the efficient development of aviation within the navy.

Fifth. That the Air Mail Service of the Post Office Department be further extended and developed. This service has given the best demonstration of the practicability of the use of aircraft for civil purposes. It has been seriously handicapped by inability to secure suitable airplanes adapted to its work. The question is one of design, which should be handled by the industry. The remedy lies in the development of the industry, which can only be brought about at an early date by the indorsement and prosecution by the government of a constructive, comprehensive policy.

Sixth. That the Congress approve the program of scientific research in aeronautics formulated by the committee and provide for the enlarged facilities necessary for its prosecution. Continuous scientific research is necessary for the real advancement of the science of aeronautics. The number and importance of problems requiring solution have increased greatly with the general development of aircraft, and the development of airplanes of all-metal construction will require a large increase in the aerodynamic research and engineering experimentation conducted by the committee at the Langley Memorial Aeronautical Laboratory at Langley Field, Va.—*Annual Report—National Advisory Committee for Aeronautics*, 1920.

MARTIN TORPEDO PLANES ARRIVE AT NORTH ISLAND.—Four Martin bombing planes have arrived at North Island Station from Cleveland, Ohio, and will soon be seen in the air here.

These new monsters of the air will have a wing spread of 71 feet 5 inches, the fuselage measures 45 feet 8 inches and the machine is 15 feet 5 inches in height. These monster bombing planes will weigh 6742 pounds when completed and will have a total gross life of 11,909 pounds, which includes the torpedo that she will carry, which will be an 18-inch mark 7 model 5 and will have the total weight of 1650 pounds, plus the 4501 pounds of bombs and two machine guns of the Lewis type one in the forward cockpit and one in the after cockpit; the latter will be manned by the mechanic, who will evidently have his hands full all the time handling the motors of so vast a plane and also a machine gun.

The interesting features of these planes lie in the fact that they are so vast in dimensions and are still capable of making approximately 100 miles per hour, and are to be driven through the air at that terrific speed by two 400-horsepower high compression Liberty motors.

Ensign E. E. Reeder has been appointed pilot of the first Martin bomber to be actually put in service on this coast. His vast experience in the air has made this step possible, and his persistence has been rewarded by getting the honor of being the first naval officer to pilot this type of plane.—*The Aerial Age Weekly*, Nov. 15, 1920.

ENGINEERING

ELECTRIC WELDING OF STRUCTURAL STEEL.—An article discussing the practical details in the electric welding of structural steel.

Building departments have fought shy of structural welded joints, as they did not feel sure of them. It is, however, possible to make a welded joint more definite and independent of the worker than is possible with reinforced concrete. There are four main factors in the quality of a weld: (1) The design of the joint, (2) the size of the electrode, (3) the value of the current, (4) the skill of the welder. The fourth factor can be reduced to a minimum by proper choice of the first three, and if the first three are satisfactory a failure in the fourth can be easily detected by superficial inspection by one experienced in the art of welding. The writer deals fully with design of joints and the making of the three types of joints involved, namely, fillet weld, butt weld, and rivet weld. The size of the electrode is governed mainly by the design of the joint: the effect of size is discussed. The value of the current depends on the electrode used and on the welder, and is practically limited by the skill of the latter. His skill involves choice of joint, electrode size and current, as well as actual manipulation. The two factors can be determined independently of him and in some cases by using special equipment, current and length of arc can be independent of him also. *Iron Age*, June 17, 1920.—*The Technical Review*, Nov. 2, 1920.

PULVERIZED PEAT-FIRED LOCOMOTIVES.—Some Swedish engines have been fitted with burners to accommodate pulversized peat, and the results of tests are now available.

In addition to the burning of peat, the firebox is arranged with a small grate for coal, which is hand-fired. The coal burnt is about 3 or 4 per cent of the peat, by weight, and it acts as an igniter for the incoming mixture of peat and air. The peat is dried to 12 to 16 per cent moisture and powdered to pass through a screen having 100 meshes per sq. cm., two tons of fuel being obtained from 3 tons of air dried turf. This fuel has been analysed, and from comparative tests made on the line it is shown that the peat fired locomotive has an overall boiler efficiency of 73 per cent with a firebox temperature of 1670° F. against 65 per cent and 1510° F. for hand coal-fired engines. Four thousand kg. of peat will haul a freight train of 650 tons for 100 km. or a passenger train of 300 tons for 130 km. at given speeds.

It is claimed that this system is simple, that coal-fired engines can be converted to peat firing with a minimum of trouble and expense, and that the fitting of such engines enables local fuels to replace imported coal. (*Railway Engineer*, July, 1920.)—*The Technical Review*, Nov. 16, 1920.

APPARATUS FOR ELIMINATING SMOKE FROM STEAMERS.—Describes an arrangement designed in Italy which has met with the approval of civilian and official expert authorities and which avoids the disadvantages attached to apparatus adopted during the war, where the smoke was ejected from the sides of the vessel causing the cabins, etc., aft to be in a filthy condition and leaving a heavy continuous cloud of smoke on the surface of the water which would still serve as a guide to submarines.

The new arrangement consists in the utilization of the circulating water of the condensers in a special apparatus for reducing the temperature of the smoke as it comes from the boilers and clearing it of all matter in suspension. The cooled gases can be discharged either above deck or outboard above the water-line. The advantage of this arrangement for warships are obvious, allowing of clear decks and, in the case of large submarines, of high speeds demanding the use of steam engines and boilers, the present serious inconvenience experienced of chimneys becoming distorted when immersing, rendering perfect closing of openings in the deck impossible, would be avoided. (*L'Industria*, July 15, 1920.)—*The Technical Review*, Nov. 9, 1920.

REMARKABLE DROP IN OUTPUT OF CENTRIFUGAL, PUMPS AFTER STARTING.—Observations made by the author indicate that many centrifugal pumps show a gradual falling off in efficiency after running for some time. Two characteristic cases are cited in connection with the large pumps used for pumping the Haarlem mere. In the first the output fell to 30 per cent below the normal, and in the second case a marked increase in the energy consumption was noticeable shortly after the pump was started. On stopping and starting the pump, the normal output and energy consumption were again obtained; but the conditions gradually fell back to those previously discovered. After discussing the influence of a possible accumulation of gas (from a peaty soil) in the suction pipe, the author rejects this explanation as being insufficient. He ascribes the cause to the fact that turbine pumps of the Francis type are designed on the assumption that the inflowing water is moving in an axial and not a rotary direction. This assumption is undoubtedly correct during starting, but it can be readily demonstrated that very little would be required to impart a rotary movement to the incoming water column, *i. e.*, the mass of water would move in a spiral through the pipe. This rotary effect would explain the phenomenon and also the fact that in turbine pumps with a high circumferential speed, and where little or no rotary motion would be imparted to the incoming column of water, this falling-off in output disappears. The author is of opinion that the transmission of this rotary motion from the rotor of the pump back along the incoming water column is considerably accelerated by the presence of large quantities of suspended matter in the water. The obvious solution of the difficulty for low-speed turbine pumps would be the introduction of a rib or ribs in the suction pipe, to prevent a rotary motion from being imparted to the incoming water column. (*De Ingenieur.*)—*Journal of Am. Soc. M. E.*, Dec., 1920.

THE NAVAL EXPERIMENTAL LABORATORY.—The new naval laboratory for which Congress has appropriated $2,000,000, owes its inception to the Naval Consulting Board. It will be remembered that one of the first recommendations of this body was the building of a large and thoroughly equipped laboratory in which promising inventions could be investigated and rejected or developed, as the case might be, on a scale and with a completeness which existing conditions in the Navy Department rendered impossible. In furtherance of this scheme a committee of the board, composed of men who were expert in laboratory work, was appointed to formulate a general plane and select a site. For various reasons, they reported to the board in favor of Annapolis; but in the discussion which followed some diversity of opinion developed, notably in the case of Mr. Edison, who was strongly in favor of New York.

This took place after 1914 and before our entrance into the European war. The rush of our preparation for that great conflict and the multiplicity of larger problems that developed, coupled with the fact that there was an offer to the government of many private and well-appointed laboratories, caused the subject to be dropped for the time being. It should be mentioned, however, that the choice of Annapolis was favored by naval officers, who pointed out that the government had already established an experimental laboratory at that location, which had cost about $600,000, and that there was ample land for expansion of the plant. Also it was urged very strongly that the work of the laboratory be coordinated with that of the Naval Academy, and particularly with the work of the postgraduate school, which, by the way, has been opened up again since the war, and is to be greatly expanded. The point was made that an adequate experimental and research laboratory at the naval college would enable the student officers to do special research work, and that the experts of the laboratory might be employed as lecturers at the postgraduate school. In the minds of many naval officers this was the strongest of all considerations.

However, the laboratory committee, after giving due weight to the opinion of naval officers, has finally decided against Annapolis, and in favor of a site at Bellevue, a naval reservation near Glesboro Point on the Potomac and lying in the District of Columbia. The site is opposite and about one mile distant from the War College at Washington.

The principal considerations which led to the choice of the Washington site are first, the desirability of locating the laboratory as near as possible to the Bureau of Standards, with which institution the work of the laboratory must necessarily be carried on in close and continual coöperation. Secondly, it was considered desirable that the laboratory should be built within easy reach of the various naval bureaus, particularly those of Construction and Repair, Steam Engineering and Ordnance. Another consideration was that of assuring the future finances of the institution, which would have to come in the form of appropriations from Congress. Laboratory work and plant is frequently difficult to explain to the lay mind. If the laboratory were located within half an hour's automobile ride from the Capitol, it would be possible to take the committee down and show them work which was being done and explain on the spot why the requisite appropriations were necessary. A final reason and alas, perhaps the most important of all, was that by locating the laboratory in the District of Columbia, whose residents have no vote, it would insure that the financial prosperity of the institution would not depend upon those familiar tactics known under the name of "log-rolling." If Congressmen had no particular political object to further by giving or withholding appropriations, it was realized that the prospects of the claims of the laboratory obtaining just and unbiased consideration would be greatly enhanced.—*The Scientific American*, Nov. 13, 1920.

SOMETHING NEW IN ARC LAMPS.—About two years ago we had something to say regarding a novel form of enclosed arc employing tugsten electrodes and enclosed in a high vacuum, developed in England. At that time the inference was that the lamp was of a purely experimental nature, but we learn of late that this arc lamp is a commercial success. Briefly, the lamp resembles a round incandescent lamp so far as exterior design is concerned. Instead of the usual filament, however, the lamp contains a small ball of tungsten, a horizontal tungsten rod, and a small tungsten coil right over the tungsten ball. To start the arc the vacuum must first be bridged, since the electrodes are fixed. This is accomplished by passing a current through the tungsten filament which becomes incandescent and heats the surrounding vacuum. Then the current is switched over to the gap between the horizontal tungsten rod and the tungsten ball. The heated vacuum, no longer being an insulator, carries over the 110-volt current and the tungsten ball is heated to incandescence by the arc. The result is an extremely concentrated source of high candle power, suitable for numerous purposes. At present M. Belin, the inventor of the system for transmitting photographs over telegraph and telephone lines, is using such a lamp for the source of light in his receiving set. The details of M. Belin's apparatus appeared in our November 6 issue.—*The Scientific American*, Nov. 20, 1920.

THE PRESENT POSITION OF THE MARINE DIESEL ENGINE.—As a result of the war, considerable gaps are to be found in the technical progress of many peaceful pursuits, and in those cases that apply to British marine engineering, these must be bridged if our position is to be fully maintained. In this country, during the years 1914 to 1918, considerations in connection with the development and applications of the Diesel engine for mercantile purposes were almost completely shelved. The exigencies of this period of stress and danger necessitated concentration on that type of machinery—the triple-expansion steam engine—most capable of being easily and rapidly produced by those manufacturing plants less suited to the duty of meeting the requirements of the fighting forces.

In reopening the subject of the marine Diesel engine, after its absence from the proceedings of the institution for six years, I propose to confine my remarks solely to the broader issues, in view of the fact that at the moment so many shipowners, shipbuilders, and engineers are considering this new prime-mover chiefly in its general aspects.

Conditions operating at present, resulting in large measure from the war, make most potent the claims advanced in favor of the principle of internal combustion. Quite suddenly and recently for the mercantile marine, fuel oil has been very widely recognized as the most suitable combustible. Not the least compelling factors towards this marked preference have been the labor and wages movements ashore and afloat. Some fears are entertained regarding supply and distribution of liquid fuel, but with transporting tonnage increasing and the likely early development of petrol substitutes, supply should continue to equal demand. Whether grounds may be found upon which to base such fears, all must be agreed as to the fundamental necessity of conserving available supplies by the exercise of the maximum economy. The effect of the operation during the war of strict discipline in national interests has rendered easier the acceptance of the doctrines of economy whatever the direction in which they are urged, and has made even the most retrogressive of men receptive of suggestions to this end.

Many engineers have now become familiar with the leading principles of internal combustion, and more Diesel work has been undertaken at home within the last few years, due to submarine naval requirements, than in any previous period. Many of the salient points are now appreciated, and growing interest is stimulated and met by the technical literature increasingly available.

Recent experience with the most modern and economical steam installations applicable to merchantmen of average speed—the steam turbine and double-reduction gearing—has demonstrated clearly that the step from single to double reduction is not one of mere multiplication. New factors have been introduced and different values must be given to the various forces in operation. A complete solution, whether dependent upon a combination of all or principally upon a few of the many variables will no doubt early be found. The large number of factors entering into this question is sufficient alone to suggest its nature. The most important of these are lubrication, alignment of shaft, coincidence of helical angles, material and design of inter-meshing teeth, pressure and rubbing velocity between teeth, torsional vibrations, all of which play their parts. The present position, however, is such as to give to the Diesel engine a greater prominence than it might otherwise have achieved, in spite of the somewhat retrograde step from purely rotary to reciprocating motion.

The past record of the oil engine at sea shows in a striking manner the relative success of the four-cycle principle applied to single-acting engines. Ships fitted with two-cycle engines are in mostly isolated cases. Four-cycle engined ships are generally more than usually interesting units of fleets of considerable size and importance, of one type of four-cycle slow-running engine alone 122,000 indicated horsepower are at sea.

Experience during the war with submarines also showed the four-cycle engine in favorable light.

Where reduction of weight, compactness, maximum power per unit volume of ship occupied by internal-combustion machinery were the chief considerations, the four-cycle principle was found fully to meet the requirements. In Germany the two-cycle engine was most favored for marine work prior to 1914, but for submarine propulsion during the war this system was gradually dropped. Ultimately, by far the largest number of German submarines and all having the highest power per unit had four-cycle engines. In our own navy the four-cycle principle was almost exclusively adhered to.

The present position reflects clearly the finding of past performance and an analysis of the marine Diesel machinery under construction in all engineering countries is given here.

The figures are based on the published particulars of 184 ships and their machinery.

(1) The total tonnage expressed as deadweight capacity is:

One million two hundred and sixty-three thousand tons, divided as follows:

Two-cycle = 208,000 { Single screw, 64,000 tons deadweight. Twin screw, 144,000 tons deadweight.

Four-cycle = 1,055,000 { Twin screw, 1,005,000 tons deadweight. Single screw, 50,000 tons deadweight.

(2) The total brake horse-power is 405,000, of which 326,500 is four-cycle, and 78,500 two-cycle. The indicated horsepower is in approximately the same ratio.

(3) Of the 325 engines comprised in the above totals, 275 are four-cycle, and 50 are two-cycle.

(4) The average brake horse-power per engine is 1240, the four-cycle being 1190, and the two-cycle 1570. The average brake horsepower per cylinder is 210; in the case of the four-cycle 194, and the two-cycle 309.

Eighty-four per cent of the ships are twin screws and over 80 per cent of the total number of marine engines and horsepower is of the four-stroke cycle type. In Britain the two-cycle is more favored than elsewhere.

The most important of the problems of design are common to both two- and four-cycle engines and the first concerns the injection of the fuel into the working cylinder. The exact quantity of fuel, at a pressure sufficient to ensure injection, must be measured out by the pump and spread in some 30 degrees of revolution as widely as possible into the combustion space, in a sufficiently finely divided state to ensure rapid ignition and satisfactory combustion chiefly in this direction of improving distribution of the fuel in the combustion chamber can increased economy be sought.

There are two alternative methods of spraying; one by means of compressed air, the other by injecting the fuel at a high pressure known as the solid injection system. The utilization of compressed air is most general. So far as marine installations are concerned, the principal advantage of the solid-injection method, where compressed air is not used to assist injection, is, that the air-compressing machinery required for supplying maneuvering power, is not a part of the main propelling engine, and does not require to run continuously at sea. Moreover, the air-compressing plant, where solid injection is adopted, can be reduced by from 40 to 50 per cent in capacity.

Reliability with air-compressors delivering at 850 to 1000 lbs. per sq. inch has now reached a high level, the leading factors towards this end being generally appreciated, and air-compressor problems rated at their full value. Multistaging is essential, and compression to 1000 lbs. per sq. inch should be carried out in not less than three stages, so proportioned that no undue ratio of compression and consequent temperature can occur in any stage. Particularly should the l. p. compression be minimized. Such rises of temperature as are inevitable with compression should be reduced by efficient cooling of the air during compression and by the installation of intercoolers and aftercoolers to reduce to atmospheric whatever temperature remains after compression. Removal of moisture from the air should be facilitated. Every effort in design should be made to ensure that the compressor valves and springs can be easily removed and replaced.

It is not to be inferred in any way that finality has been reached in compressor design or in methods of injection. In regard to the former a better method for removing oil and moisture from the air is required, and in respect of injection a suitable valve should be produced which, whilst requiring compressed-air spray for full power and maximum efficiency, can still operate satisfactorily at reduced power without the medium or assistance of compressed air.

The other fundamental or injection, the measuring of the oil fuel, involves the most delicate apparatus associated with the Diesel oil engine the fuel injection pumps and controlling gear. The system of having one pump per cylinder is now almost universal for marine work (excepting where solid injection is used), and only in this way can the maximum security against a large percentage of overcharge and overload in one or more of the cylinders be obtained. These individual pumps, therefore, become of relatively small size. Even with separate pumps, continual care and intelligent supervision must be exercised to ensure that the deliveries from the pumps are maintained equal, lest one or more cylinders should be overloaded to counteract the effect of diminished deliveries from defectively working pumps. Means are now generally provided whereby any pump can be cut out and overhauled whilst the remainder are in operation.

The Diesel engine remains a heavy and expensive prime-mover in comparison with its steam rivals. Even with the progress made in design within the last six years, it can be definitely stated that there has been generally an increase in the weight and the space occupied by the slow-speed Diesel engine per horsepower developed continuously. The factors opposed to a reduction of these disabilities and rendering difficult the path towards the higher powers now desired, are the temperature gradient through the metal surrounding the combustion chamber and the fact that the major portion of the material of the engine is only utilized for a small fraction of the running time. The former refers particularly to the two-cycle, and the latter to the four-cycle engine, where three quarters of the running time is idle so far as power output is concerned. Moreover, of the one-power stroke per two revolution, only one-half or 12.5 per cent of the cycle stresses the parts of the engine comparably with their strength and scantlings.

The unique economies possible by the adoption of the principle of internal-combustion are only gained at the expense of foregoing all the many advantages derived from using the most flexible known power conveying medium, steam.

To appreciate the type of stressing to which the main parts of a Diesel engine are subject, comparison may be made with a steam engine of normal design and of equal power output. The maximum normal load with the oil engine is more than five times as great, and, furthermore, the rate of application of this main load is increased ten times.* With internal-combustion the normal stresses are liable to sudden increases calling for a larger factor of safety, and design questions relating to the main parts of the engine must be considered strictly in this light.

In regard to the temperature gradient and the stresses so incurred, data are lacking; but, so far as they are available, they go definitely to prove that the four-stroke cycle engine has distinct advantages. The temperature gradient through the metal of a four-cylinder liner and through the furnace of a cyindrical marine boiler are substantially equal. In the former the stressing is intermittent, and in the latter relatively steady. The stresses consequent upon this temperature gradient are half as high again in the case of the boiler furnace, due to the higher co-efficient of expansion and modulus of elasticity of steel as compared with cast iron. With the cylinder liner the transmission of heat is a subsidiary function to the more important duties of guiding the power piston and maintaining a suitable surface to permit of piston-ring gas tightness with minimum friction. The simple liner form of construction adopted up to the present with all but a few exceptions, cannot be approved on theoretical grounds. To obtain a minimum value for the combined stress consequent upon temperature gradient through the metal and internal pressure, a ribbed and

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* Proc. of the Junior Institution of Engineers, May, 1914. "High Power Diesel Engines; Their development for Marine Service."

TABLE I.

COMPARISON OF RUNNING COSTS OF DIESEL SHIPS AND STEAM SHIPS.

	1,000 Brake horse-power					2,400 Brake horse-power				
	Single-screw, Diesel, 1,000 B.H.P.	Single-screw, double-reduction geared, 1,000 S. H. P.		Single-screw, reciprocating, 1,200 I H.P.		Twin-screw, Diesel, 2,400 B.H.P.	Single-screw, double-reduction geared, 2,400 S.H.P.		Single-screw, reciprocating, 2,800 I. H. P.	
		Coal	Oil	Coal	Oil		Coal	Oil	Coal	Oil
Fuel, lbs. per H.P. per hour	.45	1.5	1.1	1.95	1.4	.45	1.5	1.1	1.75	1.25
Consumption, tons per day	4.82	16 1	11.8	25	18	11.6	38.6	28.3	52.5	37.5
Consumption, tons per 30 days	145	483	354	750	540	348	1,158	849	1,575	1,125
Price of fuel per ton	£11	£5	£10	£5	£10	£11	£5	£10	£5	£10
Cost of fuel per 30 days	£1,595	£2,415	£3,540	£3,750	954 00	£3,828	£5,790	£8,490	£7,875	£11,250
Lubricating oil consumption, gallons per day.	10	2	2	3	3	21	3	3	5	5
Lubricating oil, cost per gallon	5/-	5/-	5/-	5/-	5/-	5/-	5/-	5/-	5/-	5/-
Lubricating oil, cost per 30 days.	£75	£15	£15	£22 10	£22 10	£157 10	£22 10	£22 10	£37 10	£37 10
PERSONNEL—										
Chief Engineer	1	1	1	1	1	1	1	1	1	1
Assistant Engineers	3	2	2	2	2	6	3	3	3	3
Greasers	3	3	3	3	3	3	3	3	3	3
Firemen	—	3	3	3	3	—	9	6	9	6
Trimmers	—	3	—	3	—	—	4	—	4	—
Donkeyman	1	1	1	1	1	1	1	1	1	1
Electrician	1	—	—	—	—	1	—	—	—	—
Total engine-room staff	9	13	10	13	10	12	21	14	21	14
Total wages, 30 days	£191	£224 10	£195	£224 10	£195	£252 10	£380 10	£265	£380 10	£265
Total upkeep per 30 days, at 7/- per day.	£94 10	£136 10	£105	£136 10	£105	£126	£220 10	£147	£220 10	£147
Total wages, fuel, oil, and upkeep for 30 days.	£1,955 10	£2,791	£3,855	£4,135 10	£5,722 10	£4,364	£6,413 10	£8,924 10	£8,513 10	£11,699 10
Ratio	1	1.44	1.97	2.12	2.93	1	1.47	2.04	1.95	2.68
Net saving per annum of 200 days sailing, Diesel over steam.	—	£5,570	£12,650	£14,520	£25,250	—	£13,650	£30,390	£27,645	£48,850

NOTE.—In addition to the above, the following savings are effected. Fueling costs, less demurrage, additional cargo capacity, less accommodation for engine-room staff, no stand-by losses, less cleaning ship, higher average-speed in a sea-way, reduced fueling appliances required, etc.

built-up form of construction must be adopted. This can very simply be accomplished, as is sometimes the case, with the four-cycle engine, but imposes greater difficulties in the case of the two-cycle, where exhaust and scavenging ports have to be accommodated in the cylinder. Computation of the high stresses with the two-cycle cylinder in way of the scavenging air-inlet and main-exhaust ports is extremely difficult. These are bound to be very considerable in view of the high velocity of the exhaust gases and the consequent high rate of heat transmission from these gases to the walls, and are further intensified by the cooling and distorting effect of the entering scavenging air with the normal two-cycle design.

Better Utilization of Materials.—For a better utilization of materials than is achieved with the four-cycle engine, the two-cycle single-acting, the four-cycle double-acting, the opposed pistons construction, and the two-cycle double-acting principles, or the combined effect of oil and steam as with the "Still" engine are put forward. However attractive may be the mechanical arrangements so facilitated, the Diesel oil-engine is a complicated machine highly loaded and stressed by high-pressure combustion within the cylinder, and short-cuts to achieve reduction in space, weight, and cost, will only be fruitful in so far as first principles and fundamentals, more especially in respect of rate of heat transmissions, are not violated.

TABLE II

COST OF FUEL OIL AND COAL AT PRINCIPAL PORTS, JULY, 1920

Port	Fuel oil per ton	Coal per ton	Port	Fuel oil per ton	Coal per ton
Alexandria ..	250/–	186 to 200/–	Karachi.....	150/–	45/–
Adelaide.....	180/–	40/–	London.....	250/–	115/–Welsh.
Batavia.....	150/–	127/–	Liverpool....	250/–	115/–Welsh.
Bombay.....	150/–	45/–	Lisbon.....	250/–	160/–
Buenos Aires.	265/–	170/–	Madras.....	150/–	45/–
California ...	62/– to 92/–	69/–	Melbourne...	180/–	35/–
			New Orleans.	58/2	40/– to 69/–
Christiania...	224/–	210/–	New York....	47/6	55/– to 68/–
Calcutta	250/–	25/–	Palembang...	125/–	127/–
Cape Town...	220/–	46/9 Transvaal.	Pensacola....	80/–	42/–
			Port Said....	250/–	186/6
Colombo.....	159/–	102/6	Panama.....	75/–	125/–
Curacao	80/–	125/–	Rotterdam...	220/–	160/–
Glasgow.....	250/–	115/–Welsh.	RiodeJaneiro.	250/–	185/–
Hong Hong..	150/–	115/–Welsh	St. Thomas...	160/–	124/–
Havana.....	142/6	125/–	Sydney.....	175/–	21/3

Average price per ton: — Coal = 104/–; Fuel Oil = 191/–.

The foregoing conditions of design of the Diesel engine prevent it being a cheap and light prime-mover. Increased experience, better materials, more efficient utilization of such masses as are required to cope with the pressures of the cycle, with standardization, will, in due course, effect a reduction in these disabilities.

At present the cost can be stated to be from 25 to 33 per cent more than for a steam plant, depending in the type of auxiliaries applied to the oil-engined ship, and when comparison is made with steam-reciprocating or double-reduction turbine steam machinery. This higher cost of machinery is minimized in effect by the greater cargo-carrying capacity some-

times possible by the adoption of oil engines, or alternatively by the fact that a smaller Diesel-engined ship serves to give equal earning capacity with a steamer. The economy of operation possible with the oil engine is such that, granted reliable performance, the extra first cost is speedily balanced by the increased profits obtainable. Table I indicates in two cases the nature of the comparison. The total saving for 200 days' sailing per annum by installing Diesel instead of steam machinery is given for wages and upkeep, fuel, and oil costs, in the case of a single-screw ship of 1000 b. h. p. and also of a ship of 2400 b. h. p.; twin screw in the case of Diesel engines and single screw in the case of steam. No estimation has been made regarding the other savings generally possible, the most important of which is additional cargo capacity, no stand-by losses, and higher average speed, more particularly when the oil is compared with the coal-fired ships. The figures, however, for the savings in fuel, lubricating oil, wages, and upkeep are, it will be admitted sufficiently attractive to merit close attention by shipowners to the Diesel system of propulsion, when full comparisons can readily be made to meet the specific case of any particular type of ship or trade.

The prices of oil fuel and coal at various ports given in Table II may be referred to.

That after ten years of experience, keeping in view the last five years of intensive service, reliability can be obtained with the Diesel engine will not be gainsaid. The position of this new prime-mover is not yet, however, sufficiently secure for short-cuts towards the lightening or cheapening of the engine to be undertaken without the most careful consideration. The available knowledge demands that oil engines shall be rated at a moderate power-output per unit of swept cylinder volume with the consequent low-temperature gradient through, and stresses in the metal exposed to combustion temperature. Ample strength and rigidity must be given to those parts that are stressed by the pressure of the cycle, and a high quality of workmanship is essential for all the principal units. So long as labor conditions do not very appreciably change, the Diesel oil-engine will increase rapidly in importance, with the full realization of the enormous advantages of liquid fuel as a marine combustible. Satisfactory distribution of fuel throughout the world seem assured and any future shortage will first affect those plants less able to compete in regard to economy of consumption of liquid fuel. Powers up to 6000 or even 8000 b. h. p. per ship with twin screws (500 b. h. p. per cylinder) can be looked for in the near future, and gradual increases will take place successfully by short steps, consolidating each advance as gained, before proceeding to the attainment of higher outputs.

Larger Variety of Types.—Under the entirely new conditions now operating it is pleasing to reflect that at home there are under construction a larger variety of types of marine oil engines than in any other country, indicating an enterprising and progressive policy of determined trial. This is in strong contrast to the apathy with which we were charged before the war. Experience in due course with these engines will go far to enable relative values to be given to various systems and types of construction. A few may be eliminated, as has been the case with other prime-movers, but the majority will remain until gradual development and increased application enables a higher plane of performance to be reached when the issue will become narrowed down.

In the future the claims of the Diesel-electric system of propulsion will receive much more attention than hitherto, and this may prove the most secure path towards high power. Whatever the merits of steam-electric marine installations, the case for the Diesel-electric, so far as the mercantile marine is concerned, is much stronger.

The longed-for internal-combustion turbine does not yet appear on the horizon.—*Engineering and Industrial Management*, Oct. 28, 1920.

NAVIGATION AND RADIO

PITOT-LOG FOR STEAMERS.—The firm, Siemens & Schuckert, have designed a new speed indicating apparatus which according to claims made indicates the velocity of vessels not exceeding a speed of 26 knots with an error of 1 per cent.

The instrument measures the difference between the static pressure of a column of water above the measuring point, and the dynamic pressure, near the stem of the ship in an L-shaped Pitot tube, of which the long leg is vertical, the short leg parallel to the axis of the ship, with the free end pointing forwards and fitted with a nozzle communicating with the sea. It is important that the nozzle is placed in a position where it is not obstructed by projections on the hull or by discharge pipes from the ship, and that it is sufficiently removed from the stem to be outside the eddies round same. At a speed of 12 knots a distance of 10 inches is sufficient.

The short leg of the L-tube contains an inner tube through which the dynamic pressure acts, the outer tube being exposed to the static head. The difference is indicated on a special pressure gauge graduated to show the speed. The actual indication takes place close to the nozzle below water level, but can be recorded in any part of the ship, as, for instance, at the bridge. The apparatus is also supplied with a counter that shows the total distance travelled, the hand of the pressure gauge showing the actual speed at any given moment.

This form of log was adopted in the German Navy during the war, and gave complete satisfaction, (*Hansa*, July 24, 1920.)—*The Technical Review*, Nov. 2, 1920.

RADIO EQUIPMENT OF THE "VATERLAND."—On this ship recently recommissioned, there are three complete wireless transmitters, one of which is worked in connection with a high-frequency generator, this being the first instance of the use of such a generator on board ship, according to *Wireless World*. For transmitting on waves of 600 to 1800 meters, and for use with the high-frequency generator, an aerial 190 meters long is carried For shorter wave lengths and for emergency transmitting two other aerials are provided, each consisting of a single wire spread between the funnels.—*The Scientific American*, Nov. 20, 1920.

ORDNANCE

MUZZLE BRAKES FOR GUNS.—Tests on several types of muzzle brakes or gas deflectors have been made by the U. S. military authorities.

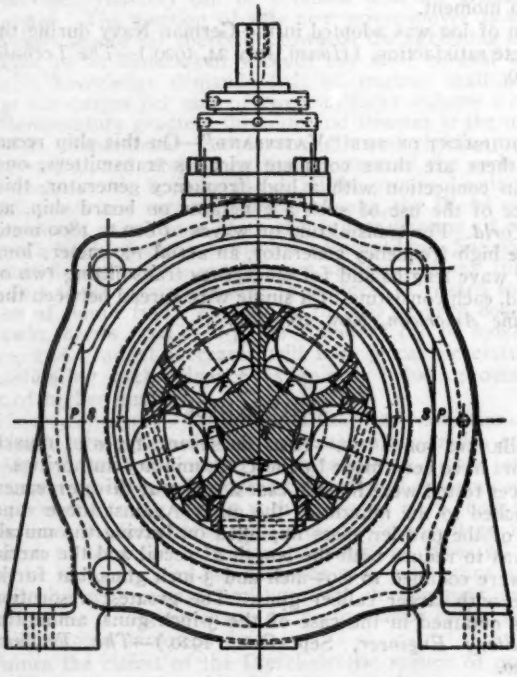
The devices tested were in each case a series of discs or vanes of varying shapes attached to the muzzle of the gun. Against these vanes a certain proportion of the powder gases impinged on leaving the muzzle, the effect of which was to reduce both the length of recoil and the carriage stresses. The tests were confined to 2.95-inch and 3-inch guns, but further tests are to be made with larger caliber guns. The greatest absorption of recoil-energy was obtained in the case of the 3-inch guns, amounting to 80 per cent.—(*Military Engineer*, Sept.-Oct., 1920.)—*The Technical Review*, Nov. 2, 1920.

CHRISTIE MOUNT FOR 155 MM. GUN.—The design of the Christie self-propelled mount for 155 mm. gun (model 1918) of the U. S. Army, embodies several new features in this class of artillery.

The vehicle is designed to travel on rubber-tired wheels on good roads and is convertible into a track-laying vehicle as required. When traveling on wheels the caterpillar track is carried on the vehicle, being so arranged as to be easily dismounted and wrapped on the rubber-tired wheels. There are eight rubber-tired wheels, the two at the breech end of the mount arranged for steering and the two at the opposite end being geared to the transmission; the intermediate wheels are spring mounted in such a manner as to carry weight or not, as desired. The complete unit weighs 44,000 pounds, and is capable of a speed of 15 miles per hour on the rubber tires. The speed as a caterpillar is practically the same, except that the steering compels slowing down. The mount can be run in either direction, but normally travels breech first.

The firing tests have proved satisfactory, and it is stated that the U. S. Ordnance Department are ordering three more mounts of this type in order to conduct service tests.—(*Military Engineer*, Sept.-Oct., 1920.)—*The Technical Review*, Nov. 2, 1920.

LIQUID VARIABLE-SPEED TRANSMISSION GEAR.—*Carey Oil Transmission System.*—Description of the pump used for an oil transmission system.



CROSS-SECTION OF ROTOR OF THE CAREY PUMP.

The rotor consists of a solid block of steel *R* in which five recesses are formed to act as cylinders. Each recess is fitted with a glass-hard steel

bush in which works an ordinary steel ball acting as a piston and having a total clearance of about one one-thousandth of an inch. These ball pistons were in conjunction with a track *T* of glass-hard steel, the track being carried by a cast-steel ring *S* which works between guides *P* formed in the cast-iron main casing or pump body. This ring may be moved to different positions in a vertical direction between the guides so that varying degrees of eccentricity may be obtained between the center of the track and the axis of the rotor, either above or below the center line. When the centers of both parts coincide, no relative radial motion takes place between the rotor and the ball pistons. As the degree of eccentricity is increased the quantity of oil delivered by the pump increases likewise until the limit of travel is reached. When the track engine is raised above the center, flow takes place in one direction and this direction is reversed when the track is moved to a position below the center line.

In each of the five cylinder recesses there is a port *F* with a hardened base and a floating valve (not shown in the drawing) having a rocking motion and also a rotating motion so that it can adjust itself to the position of the rotor. This valve carries the inlet and outlet ports.

By combining two machines of this type it is possible to make a variable-speed transmission gear. One machine is driven by a prime-mover at constant speed and acting as a variable-stroke pump delivers oil under pressure to the other machine which acts as a hydraulic motor. This can be done by coupling up two Carey machines back to back, but with their respective back covers replaced by a single junction casing which carries the two floating valves and provides the necessary passages for the flow and return of the working fluid. The ratio of speeds between the driving pump and the driven pump is controlled by the lengths of the strokes of the two machines.

It has been found that for speeds up to 500 r. p. m. these transmission gears may be filled with oil, but for higher speeds it is desirable that the rotor should run in air.—(*The Engineer*, Sept. 17, 1920.)—*The Journal of the Am. Soc. M. E.*, December, 1920.

MISCELLANEOUS

WHY NOT THE TORPEDO MOTOR BOAT CARRIER?—In the contest last summer for the Harmsworth Cup, the race was won by a little 26-foot motor boat which is credited with an official speed of 70 miles an hour. It detracts nothing from the credit of the victory to say that *Miss America* consisted of a pair of Liberty engines with a boat built around them. She showed what the gasoline motor was capable of doing under extreme conditions of maximum power of engine and minimum size and weight of boat.

To the serious naval constructor, who at no time in the progress of his art has been hedged about with so many and so difficult problems as to-day, the mere fact that any kind of a sea craft has made 70 miles an hour should be a matter of great significance. He knows full well that, starting with a basis of two Liberty motors, or 800 horsepower, which is what *Miss America* carried, it would be possible to build a torpedo-carrying motor boat whose offensive power could be increased in proportion as speed was sacrificed. To put it more concretely, he could make a guess offhand that a modified motor boat of the *Miss America* type, larger, stronger and more seaworthy, could be built that would carry a 21-inch torpedo at a speed of 40 knots. *Miss America* was built for fair weather and smooth water, and it is well understood that the phenomenal speed of these little craft falls in porportion as the seas run high. Nevertheless, it is quite possible, by increasing the size and modifying the model, to produce high-speed craft which will hold their speed under conditions in which the out-and-out hydroplane of the *Miss America* type would be helpless.

Rear Admiral Taylor, Chief Constructor, in his recent masterly summing up of the naval lessons of the war before the Franklin Institute, commented favorably upon the work done by Allied motor torpedo boats during the war. "The little boats," he said, "performed splendid service off the Belgian coast," referring, no doubt, to the British 40-knotters, which, on their very first cruise sank a German destroyer. He stated also that "the most spectacular and at the same time most valuable service performed by boats of this type was the daring penetration by the Italians into a fortified Austrian harbor, where they sank a battleship lying at anchor. Later, in operations against the Bolshevists, a small British flotilla penetrated to the inner harbor of Kronstadt, where they succeeded in sinking two battleships and two other large vessels."

These performances seem the more remarkable when we remember that they were accomplished by experimental vessels, the first of their type to be built. Subsequent improvements, as worked out in this country, are in the direction of greater size and seaworthiness, coupled with a wider range of action, better accommodations for the crew, and ability to carry the largest torpedoes.

The point is made by the naval constructor that the objection to such craft is that they are too small to keep the sea with the main fleet. It is undeniable, on the other hand that, were it possible to take two or three flotillas of 40-knot, torpedo-carrying motor craft into such an action as that at Jutland, they would inevitably exercise a controlling influence on the tactics of the battle, and might well prove to be its deciding factor; for we must remember that there was a calm sea at Jutland throughout the whole of the day and night engagements.

But how are motor boat flotillas to reach the scene of a battleship engagement on the high seas? They have neither the cruising radius nor the sea-going qualities to enable them to cruise with the fleet. So, if they are to get to Jutland, they must be carried there. In this respect the problem is parallel to that of the airplane which, it was known, would be a formidable weapon could it be present in numbers at a naval engagement. In the case of the airplane the problem was met by designing special airplane carriers, and in the case of the torpedo motor boat it can be solved in the same way by providing motor boat carriers. These would be unarmored cruisers about 800 feet in length and of 35-knot speed, specially built for carrying forty boats on two decks. The boats would be stowed, two abreast, throughout the full length of the ship, and electrically operated davits would be provided with gears sufficiently powerful to put the first flotilla of twenty boats in the water within a few minutes' time and a second flotilla of the same size shortly thereafter.

It is a question worthy at least of consideration, whether four such ships, taking position on the four wings of an enemy's line of battle would not constitute a more deadly threat than four battle-cruisers of the same size and speed. We do not say that they would, but we do claim that the question is worthy of the most careful consideration of our naval constructors, of our War College and of the General Board of the Navy.—*The Scientific American*, Nov. 20, 1920.

THE LEAGUE'S SWADDLING-CLOTHES.—A child wrapped in swaddling-clothes, according to a custom not everywhere extinct, may not be a very lively infant, but its immobility is not to be mistaken for death. So the infant League of Nations begins life all bound round with a complexity of prejudices and distrusts and legal limitations and financial difficulties and political obligations, hindrances, and burdens of every kind. Among the observers about the cradle some predict that these wrappings will smother the child, others that the child will manage to survive though handicapped for a while, and still others believe that these bonds will actually help development into straight and sturdy youth. Many editorial friends of the League are frankly disappointed with the results of the Assembly's sessions at Geneva, anti-Leaguers who once professed to fear a "super-government"

now jeer at its "helplessness," while others set themselves to balance fond hopes and gloomy apprehensions against the actual accomplishments reported from the League's headquarters. One view is well represented by the disappointed liberal editor who thus sums up the situation in *The Nation:* "The League, born as a splendid dream of international peace, is settling down to a task of international clerking which it can do well and which it is well that some such organization should do. But success at settling the Aland Islands question or at regulating cable control should deceive no one into believing that this is the League to end war for a vision of which men died." Correspondents of the Hearst newspapers follow up their chief's campaign against the League by reporting that "within the austere hall of the Calvinist Reformation at Geneva the most sordid battle has been engaged in for purely selfish motives under the cloak of the Universal Brotherhood of Man." But a New York *Times* correspondent observes that despite obstacles, both temporary and permanent, the big accomplishment of the Assembly will have been that "forty-one nations met at the same table to discuss their affairs and difficulties. That never happened before in the history of the world." "The solemn declaration of Senator Harding and Senator Lodge that the League was dead was made almost ludicrous by the animation, by no means of a galvanic sort, which marked the opening reading of the Assembly," says the Springfield *Republican*. The League, we are told, "may blow up, and it is necessary to recognize the perils, internal and external, by which it is beset, but it is not likely to pass away quietly in its sleep." For this first session of the League's most popular body showed conclusively, in the opinion of *The Republican*, that it is filling a long-felt want; because, though executive action is taken by the League Council, "the Assembly does give even the small nations a chance, which in the age of dreadnought states they had lost, to get a hearing and to exert influence. It does for them something like what proportional representation does for minority parties; the great states, like the great parties, may prevail, but it is something—indeed, it is very much—for the smaller groups not to be disfranchised."

"The small nations are in control in the Assembly," says a New York *Herald* writer. In particular, as several correspondents observe, the point has been reached where the Latin-American states are in a fair way to gain a balance of power. Hymans, a Belgian, was elected President. Out of twelve chairmanships and vice-chairmanships of committees, nine were given to Latins, all but three of them from Latin-American countries. At the very opening session a call was made for amending the League Covenant to provide that the member states of the League Council be elected by the Assembly instead of having the big Powers kept in the Council in perpetuity. The Assembly, observes Mr. Charles A. Selden, New York *Evening Post* correspondent at Geneva, as it represents all member states, "does not propose to be the dog wagged by the tail, which latter, in its opinion, is the Council representing only eight states." This attitude is wholesome, declares Mr. Selden, who continues:

"That there are differences in the Assembly itself and that the Assembly is determined to give greater democracy to the Council are healthy signs of the League's virility and must not be mistaken for weakening dissensions. Another year of such complete and deadly harmony as the Council has displayed since its organization would have been a real danger. Not so this man-fashion give and take of Slavs, Scandinavians, Latins, Anglo-Saxons, and Asiatics."

At Geneva, according to Mr. Selden, it has become an axiom that the defence of the Council in its present form "labels a delegate as a reactionary." The New York *Globe* sees in the contest between the small and neutral nations so powerful in the Assembly and the Great Powers represented in the Council a great struggle between the old statecraft and the new. The dissension, it says, is "between those who stick to the temporary advantages of the old system and those who are willing to make temporary sacrifices in order to promote the new." That is:

"The neutrals and the smaller nations, who stand to gain most with the least loss, are in favor of complete and immediate acceptance of the new obligations the belligerents, who have on their hands an immense amount of the spoils of war, are more reluctant.

"The meeting at Geneva has taken the form of a skirmish between the old and the new. The old statecraft won when it was decided that meetings of the powerful Assembly commissions should be held in secret. It won again, if Mr. James, of *The Times*, is to be relied upon, when the representatives of the mandate-holding Powers were given a real, although not a nominal, control of the mandate commission. It wins whenever the Council takes away a function from the Assembly or assumes a new and arbitrary function of its own.

"But this was to be expected. The ideals of the League preamble can be realized only after a long and persistent assault upon the seats of arbitrary power. Against the will of the secret council chamber, when that will is reactionary, must be directed the will of an informed world public. That is the Assembly's main business, and it is carrying it forward not wholly without success."

On the other hand, some are disappointed at the little progress made along these very lines. In a dispatch to the New York *Herald*, Mr. Laurence Hills says that too many representatives of the small nations the League under its present organization "is appearing more as an alliance of the large Powers to defeat the more liberal aims of the smaller ones." There is disappointment, he says, because no strong stand was taken for disarmament, because all proposals for amending the Covenant were put over until next spring, and because of the failure to organize the international court of justice, "with a compulsory jurisdiction feature which would permit the small nations, provided a large Power was the aggressor, to summon such a Power into the court." Seeing the futility of getting the Great Powers to reduce armaments, "the small nations have lined up behind Brazil's resolution to make the manufacture of armament a state monopoly." Another evident disappointment, we read:

"Is the discovery that the mandate idea in the Covenant is a mere fiction. Virtually all the non-mandatory nations in the League have the same idea as was expressed by the United States in her note to Great Britain on the Mesopotamian oil case, namely, that all nations have the same advantages economically under the mandate plan, but Great Britain has advanced a theory here from which it is plain she is not to be dislodged from control of the Mesopotamian oil fields, that she assumed the mandate for Mesopotamia at a heavy loss and that economic privileges must go to the mandatory Power as partial reimbursement when such Power carries 'the white man's burden.' Also it was insisted that mandates were irrevocable; that they constitute perpetual trusteeship."

Though the Geneva gathering was larger than The Hague conferences, *The Nation* finds two "profound differences," to the discredit of the recent one:

"Two great nations, Germany and Soviet Russia, are ostracized, uninvited to the meeting; and the little nations enter this conference not with equal rights but as lesser partners in an enterprise bound to the chariot-wheel of the Entente victors. It is this stringent domination of the so-called Great Powers which infects the very basis of the League; this, the difficulty of amendment of the Covenant, and the unanimity required for important decisions which render the Council of the League as helpless as the old Polish Diet in which any one member could veto the decisions of all the others."

The most thoroughgoing condemnation of the Geneva Conference, however, comes from a correspondent of the Hearst papers. As Mr. C. F. Bertelli listened to the speeches at Geneva, he could feel human nature "reverting to the primordial instincts of the cavemen." And he sums up his discoveries about the selfish designs of the Powers represented at Geneva as follows:

"Great Britain fights for the world's hegemony.

"France wants the League turned into an instrument for the coercion of Germany in order to wring the last cent from her former enemy.

"Italy is keeping in mind her necessity to import iron, wheat, and coal, and she asks the members of the League to pool their own resources of raw materials.

"Japan intends to become a Power of the first magnitude, dictating her policy to the white races, and she covets Siberia.

"The smaller countries act as satellites to their chosen bigger Powers, and take the attitude of beggars in order to achieve their own particular ends, while Chile and Peru apparently have come to Geneva only to call each other names.

"The Assembly is a beehive of gossip and intrigue, the delegates engaged in a catch-as-catch-can game. Everybody seems demoralized by the very atmosphere permeating the entire organization.

"When a courageous member of the League dares to speak in the name of justice, his words are left unanswered amid the general indifference.

"Never before has the absence of the United States from a world council been so noticeable.

"The League lacks the moral foundation which only the United States can give it.

"Every one present is a member of a delegation of a nation that profited from the armistice somehow or other."

A writer more friendly to the League, Mr. Edwin L. James, correspondent of the New York *Times*, finds two very serious barriers to the League's success, which were disclosed at Geneva:

"First, the fact that the World War has not been finished long enough to permit sincere cooperation by the nations of the world.

"Secondly, the absence of the United States and Germany."

Mr. James explains with some care the importance of these barriers which, he thinks, time may remove:

"I have said that the meeting has taken place too near the Great War. How can this be better shown than in the question of disarmament, a matter about which League enthusiasts hoped to make great progress at the meeting? But Bourgeois, for France, lays down the hard fact that France will not take a single step until Germany fulfils the terms of the Treaty of Versailles and until the Allies have the complete power of investigating the state of German armament. Yet Bourgeois admits that Germany has begun to fulfil the Treaty terms, and that is considered hope for the future.

"Again, France is absolutely against the entry of Germany into the League and has blocked it until Germany shows a better disposition toward the fulfilment of the Treaty terms. This is another echo of the war. Many delegates express the opinion that it was a mistake to give the League any task in enforcing the Treaty, for whenever any question of that sort comes up those countries which were neutral during the war scoff.

"The absence of the United States also places a barrier on the whole question of disarmament. This Assembly will name a commission to study the problem, but the question may be asked, how is any one to suppose that England and Japan will agree to limit the number of their warships while America, not being a member of the League, does not submit to a similar undertaking?

"The absence of America and Germany also compromises the position of the World Court and is responsible for a certain shyness toward it by the Powers in the League. There is a distinct unwillingness to give the court power to hale all independent nations before it, and without this power, Elihu Root said at The Hague, the World Court is not very much of a fact.

"America's absence also hinders progress toward amending the Covenant, which is held to need changes, and now the leaders have decided it would be better not to take up amendments until after they know where America stands."—*The Literary Digest*, Dec. 11, 1920.

OIL TROUBLING THE DIPLOMATIC WATERS.—The world is oil mad, declared a British knight who recently visited our shores. "Certainly the world has a tremendous oil thirst," agrees the Newark *Evening News*, "and the nations are elbowing each other—none too politely—in the neighborhood of the oil-springs of the Near East." In our State Department and in the chancelleries of Europe this elbowing becomes a subject for polite notes of remonstrance on one hand and assurance on the other. Secretary Colby's recent note to Lord Curzon, British Foreign Secretary, concerning Mesopotamia, insisted, in the words of the Springfield *Republican*, "upon the claim of equality of economic opportunity for the United States regardless of its non-membership in the League of Nations." Other editors point out, however, that "oil" was the burden of the note, and the Washington correspondent of the Philadelphia *Public Ledger* declares that it "was framed in counsel with the oil interests of this country, and may be regarded as representing the views of that great industry." A Washington dispatch to the New York *Times* says London editors were quick to intimate that the sole motive behind Secretary Colby's note was to enable the United States to share in the oil of Mesopotamia, but this is denied by Washington officials; "the United States had nothing in mind except principle," they aver.

At any rate, says the Seattle *Times*, "the game of 'freeze-out' is being played on a gigantic scale in oil-producing regions." In explanation the Philadelphia *Public Ledger* declares that "the British bar civilians of all countries—their own included—from prospecting for oil in Mesopotamia, but British army experts go on developing 'for military purposes.'" Oil, therefore, thinks this paper, "bids fair to replace gold as the chief subject of international differences in the future." "In Mesopotamia there is oil, and this is the oil age," significance adds the Boston *Globe*, which also reminds us that "what the United States is asking on the subject of Mesopotamia oil is exactly what we have always been willing to grant to the whole world."

The note of the British Government, to which Secretary Colby's note is said to be a reply, has not been made public, although it was received by our government last August. In consequence, the American people have heard but one side of the controversy. In his latest note Secretary Colby said, among others things:

"I need hardly refer again to the fact that the Government of the United States has consistently urged that it is of the utmost importance to the future peace of the world that alien territory transferred as a result of the war with the Central Powers should be held and administered in such a way as to assure equal treatment to the commerce and to the citizens of all nations. Indeed, it was in reliance upon an understanding to this effect, and expressly in contemplation thereof, that the United States was persuaded that the acquisition under mandate of certain enemy territory by the victorious powers would be consistent with the best interests of the world.

"It is assumed, accordingly, that your statements with reference to Mandate A, together with the statement that the draft mandates for Mesopotamia and Palestine have been prepared with a view to secure equality of treatment for the commerce and citizens of all states which are members of the League of Nations, do not indicate a supposition on your part that the United States can be excluded from the benefits of the principle of equality of treatment.

"This Government is pleased to find that his Majesty's Government is in full sympathy with the principles formulated in its communications of May 12 and July 28. But it is unable to concur in the view contained in paragraph 15 of your note, that the terms of the mandates can properly be discussed only in the Council of the League of Nations and by the signatories of the Covenant. . . . .

"The United States, as a participant in that conflict and as a contributor to its successful issue, cannot consider any of the Associated Powers, the smallest not less than itself, debarred from the discussion of any of its consequence, or from participation in the rights and privileges secured under mandates provided for in the treaties of peace.

"The United States is undoubtedly one of the Powers directly interested in the terms of the mandates, and I therefore request that the draft mandate forms be communicated to this Government for its consideration before their submission to the Council of the League."

"We did take part, and an important part, in the far more vital business of winning the war which made the Treaty of Versailles and the distribution of mandates possible," the Philadelphia *Public Ledger* reminds us. "The Covenant of the League of Nations was not in existence when our boys went under fire at the Marne," adds this paper, and the Washington *Star* agrees that "if the United States has any rights as an associate in the winning of the war, and as signatory to the Treaty, they are not lessened by the fact that ratification has not yet been effected." "Whether we join the League or not," declares the Brooklyn *Eagle*, "we are bound to see to it that other nations do not monopolize the economic benefits to be derived from the exploitation of territory we helped to free from the Central Powers." The Baltimore *American* believes that we would have "a less-privileged position" as a member of the League than we now have out of it, as in the League we would be "subject to and bound by League decisions." But, declares the Chicago *Daily News:*

"In the League or out of it, the United States has every right to ask to be consulted respecting the terms of the proposed mandates over Turkish or German territory. Natural resources in those territories should be developed primarily for the benefit of the respective resident populations and not in the interest of the mandatory Power.

"The United States is not a member of the League, but it may become one, or it may suggest the creation of a new association of nations. In any case, the mandate principle will undoubtedly be recognized and established as infinitely superior to the policy of grabbing conquered territory and exploiting it for the exclusive benefit of the state that holds the mandate.

"The United States is just as much interested in these mandates . . . . as any nation that is a member of the League, and every mandate question that arises . . . . should also be referred to the United States," asserts the Des Moines *Register*. "It is not a Democratic or a Republican question, but a national question, that the possible disintregration of the Mesopotamian mandate has raised," adds *The Register*, and we read on:

"The relation of the mandate principle to the League of Nations is not incidental, but fundamental. It was not grafted to a League, nor was a League grafted to it. They are part of the same growth, mutually dependent parts of the same idea, and will survive or fall together."

"Important as the oil question is," points out the Indianapolis *News*, "it is less important than observance of the provisions of the League Covenant with reference to mandates. Under this Covenant it was intended that mandatory nations should be trustees, not simply for the League, but for the world. The question really is whether the selfish interests of the mandatory nations shall prevail rather than those of the people subject to the mandate, and of civilization." Then *The News* cites the San Remo agreement entered into by England and France last April:

"By the recent San Remo agreement 75 per cent of the oil of Mesopotamia was assigned to Great Britain and 25 per cent to France. It was also provided that any private petroleum company which may develop the Mesopotamia oilfields shall be under permanent British control. There could hardly be a clearer violation of the spirit and indeed, as is believed, the letter of the League Covenent than this arrangement."

"In dealing with a great international question like that of oil supply it is deplorable that petty national jealousies should be permitted to cloud the

issue," remarks the New York *Journal of Commerce*. "Let us remember that if another war is to come it will mainly be in the air and under sea; that the motor force for hostile activities must be oil, and that the control of the world's supply of oil by the Allies would make war by any future enemy a practical impossibility." This responsible business journal then notes that "the per capita consumption of petroleum in the United States has been 220 gallons, as against an average of 14 gallons per capita for the whole world," including this country. Of approximately eight million motor cars in the world, all but half a million are in the United States, we are told, besides about 90 per cent of the world's supply of internal-combustion engines. Furthermore, points out the Baltimore *Sun*, "the United States is now importing 83,000,000 barrels of petrol annually, consumption having mounted far beyond our domestic production." "The facts of the situation," adds *The Journal of Commerce*, are these:

"The world production of petroleum in 1918 was 70,000,000 tons, of which 50,000,000 was credited to the United States. The total British Empire production was 2,080,000, and that of Persia, virtually controlled by Great Britain, was 1,500,000 tons. In other words, the United States produces in her own territory nearly 70 per cent of the world's total output, and if the quantity produced by American companies in Mexico is added we should have a figure representing at least 80 per cent of the entire world's oil supply. On the other hand, the British Empire, with Persia added, has so far achieved nearly 4½ per cent of the whole."

But "the amount of oil possessed by the United States has nothing to do with the morality of Britain's action in Mesopotamia; American oil was not acquired under pretense of a mandate and then transformed into a monopoly, declares the Washington *Post*, which then reminds us that Mr. Lloyd George "made a strong argument against America holding all the German ships she had acquired," saying that "they belonged to all the nations that had fought on the Allied side."

Secretary Colby's note will serve to focus attention on British policy in Mesopotamia," thinks the Boston *Transcript*. And—

"British actions in this remote quarter of the globe furnish a test not only of the whole mandate principle, but of the motives and the purposes underlying post-war European diplomacy. If the San Remo agreement is used to advance British commercial supremacy in Mesopotamia, the world will have good cause to become suspicious of all the diplomatic bargains made by the powers of Europe. The note of the Department of State provides the British Government with an opportunity to explain whether or not it is acting in good faith in Mesopotamia. The world awaits and expects a prompt reply."—*The Literary Digest*, Dec. 11, 1920.

MEXICO ON THE WAY BACK TO NORMALCY.—The yearning for a return of the good old days of normalcy, which at this time apparently prevails in our own beloved land, seems to have spread also to our neighbors in Mexico. This does not mean that the hectic conditions in the southern Republic have been entirely overcome, but the signs are hopeful. For instance, it is said that during the administration of Carranza many citizens stabled their mules and other valuable live stock in the parlors of their homes. Now confidence has been restored to a point where even the best mules are coralled outdoors, or merely hidden in the brush. Another good sign is the absence of small but annoying insect pests from the trains. These little disturbers added their mite to the general misery of the situation during Mexico's darkest days, we are informed by Americans compelled to travel there then. Now they are gone, and their going furnishes an illustration of the general improvement that has taken place in the Mexican train service, which includes, also, better equipment, better time, and no guards to protect the passengers from marauders. The betterment of transportation may in turn be taken as an illustration of how the

country has improved along all lines during the last six months. The standard of living is higher, there are better clothes and food, mines are being opened and roads built, little pueblos, almost swept out by the *revolucionarios,* are suddenly springing into activity, and there are more jobs, more money, and busier market-places.

"Few outside of Mexico realize what its ten years' revolution has meant," says Sophie Treadwell in the New York *Tribune,* after six months in that country. She describes conditions during the revolutions as an "almost complete paralyzation of every kind of work, a constant confused inner war, with thousands of cars blown up, miles of track torn away, hundreds upon hundreds of men turned by the pressure of necessity from laborers to bandits, and any attempt at a quiet, self-respecting life impossible for high and low alike." Miss Treadwell continues:

"Elegance, lavishness, richness, flew first from Mexico with the fall of Diaz. Then culture; then, one almost might say, decency. Until, with the end of the Carranza régime, a sodden hopelessness was everywhere; and all that remained of the old national character was a certain baffled pride, sensitive beyond all reason.

"Beauty only has remained unimpaired in Mexico. Mexico City, with her Spanish doorways, Moorish tiles, French driveways, her native flowers and fountains. Under her, the dark ruins of a destroyed people. Over her, the brilliant, incomparable Mexican sky, with Popocatepetl's metallic snow shining through the delicate clouds; Iztaccihuatl, the sleeping woman; the floating gardens of Xochimilco, the castle, high over the trees of Chapultepec.

"Beauty has remained in Mexico. And hope is beginning to come back. Suspiciously, it is true, but still coming back. Can it be that peace will come again—real peace, security, prosperity, gaiety?

"As Carranza used to say to all questions of state, however ardently put to him: *'Pues, quien sabe?'* ('Well, who knows?')."

Mexico, says the writer, looks with a hopeful eye to the future to-day particularly because of the character of the men now in control. They are all from the north—Sonora—and in the veins of most of them flows the blood of the Yaqui, the Indian who never gave up, the one unconquered native of Mexico. We read further:

"Sonora is the big state farthest to the north and west of Mexico (with the exception of Baja California, which, in its geographical and political isolation, seems more like an island than a peninsula). Sonora is farthest from the tropical south of Mexico, farthest from the dominating influence emanating through centuries from the capital; nearest to the United States. Some of her border towns seem half-American. The frontier Sonoran speaks English and knows American ways.

"These are the Mexicans who now control Mexico: Obregon, Hill, Calles, de la Huerta—all Sonorans; all, with the possible exception of Obregon, carrying in their veins some few drops, more or less, of native blood.

"And these are the men who have brought at least a gleam of hope into the surrounding black of their poor country's despair.

"Although their seat is still insecure—within, new personal dissatisfactions, old personal hates; without, as yet, comparatively no recognition—yet business everywhere has taken a new impulsion. Orders for foreign trade are being placed. Land prices, at their lowest ebb, are beginning to go up. Tremendous efforts are being made to get the railroads working, the country's products under transportation. I understand it is still impossible to get a car-load of freight moved without 'oiling the way' all along the line. But I know one can buy a passenger ticket without 'passing a little change'—even get Pullman reservations."

One of the hopeful signs in Mexico is that the people seem to be going to work. To the town of Taxco, where an ancient silver-mine was opened up, 3000 laborers flocked within a short time. The writer was told of former revolutionary "generals," "colonels," and "majors" who have quit

their revolutionizing and are now content to work at road-building for seventy-five cents a day. Something of culture, also, is coming back. We read:

"Adolfo de la Huerta, the Provisional President, is an artist, a musician. He has tried, among the many more demanding urgencies upon his time, to give what stimulus he could to music.

"A clever company of comedy and burlesque players has lately come from Madrid. A brilliant writer and director of light opera, Señor Penella, has brought a company from Spain. The theaters are crowded. And an original production of Maestro Penella's, 'El Gato Montes,' has met with enthusiastic response.

"Of course, the native general wide-spread love of music in Mexico has been commented upon to the point of being tiresome. I confess I expected more from the wild native guitarist than he was able to deliver. But I always enjoyed that moment in the cinemas when the orchestra happened to go into an unpopular piece, in the midst of the star's big scene. And the entire audience, oblivious of the drama unfolding before its eyes, would burst into loud thumpings of protest, each one turning around and expostulating against the outrage with the person behind, until the orchestra was drowned out and began something else, when quiet was restored and the picture, hundreds of feet having passed unseen, was again contemplated. The iron-clad complacency of many a "movie" star would get a jolt, I think, from a Mexican audience, realizing that even the dullest Mexican peon isn't at all fooled by what is done on the screen, while he remains exquisitely sensitive to every note that is being played. A Mexican goes to the cinema to hear the music. The picture is just something thrown in.

"Something of hope, much of work, a little of culture, have come back to despoiled Mexico. But elegance has not as yet. I think I saw only one really well-dressed woman there in all the six months. Maria Conesa, the actress, understands the chic of simplicity. Her costumes were most beautifully and simply brought together, hat, gown, gloves, and shoes.

"She was the only woman I saw who, as the French say, could 'support the detail.' And one looks to women, instinctively, to reflect the elegance of a country, if there is any.

"While Mexico has lost many things during the last troublous ten years, it appears that 'personal liberty' still flourishes there. Miss Treadwell illustrates with a story:

"Just a few nights before I left the capital I was talking to an American gentleman. Our subject was, inevitably, Mexico. That is all Americans down there ever talk about. And this gentleman was, inevitably, abusing it.

"But perhaps you don't really know the country?" I suggested timidly.

Much disgust.

"Been here twenty-five years!

"Well—more timidly—if it's as bad as you feel, why haven't you gone home?"

A pause. A hush. Then—

"I haven't gone home, as you put it, for one reason, and one reason only. There is still personal liberty here."

Of course, he may have meant by personal liberty just his cognac when he wanted it. Or he might have meant only that personal freedom that comes to any "man from home" in any foreign land. But I think he meant something more than that. I think he meant, in spite of his prejudice and dislike, the thing that was America's boast a generation ago; the thing the Mexican, de la Huerta, was trying to keep alive in his most distressful country when he deliberately removed the censorship in the first darkest, most doubtful days of his Presidency; the thing he is still trying to keep alive when he refuses, at the behest of the strong of the earth, to put out the weak who have sought refuge within his country's disordered borders. No amount of pressure has so far been able to make de la Huerta deliver

over any foreigner in Mexico, even an American, not wanted for an actual extraditable offense."

Miss Treadwell praises President de la Huerta. Though of humble origin, he has proved himself during his short administration a man of true distinction, she says. A side-light on de la Huerta's character is furnished in the description of a luncheon he gave to all the foreign correspondents. We read:

"He was sick, held to a trying diet, overworked, overstrained nervously; his position precarious, dangerous; surrounded by a poisonous atmosphere of cynical criticism and suspicion. The luncheon was long, filled with food he couldn't eat. The conversation was most difficult. It wasn't conversation; it was a cross-questioning, a grilling. Questions were hurled at him, literally, from all quarters of the world. Questions whose answers deeply affected his own future and that of his country; questions flung at him with that swift, brutal, incisive frankness of the American newspaper man at home and abroad. Questions, some of which must have embarrassed him, many enraged him, and all of which tested him through and through. All his answers were invariably gracious, quick, comprehensive, graceful, witty, at times brilliant. The whole tone of the man, simple, unassuming as he is, was, in some subtle essence, distinguished. He is of Polish, Italian, Spanish, and Yaqui blood. His father was a small merchant in Guaymas."

One of the obstacles to progress in Mexico is the provincialism of the country outside the big cities and the isolation of one town from another, especially industrially. For instance, in one town only sweets are obtainable, while in the next one one can buy only knives, or blankets, or saddles. Says Miss Treadwell:

"Each little community entirely given over to making the same thing. Each man in depressing competition with his neighbor. And no provision made for exchanging the one product with something desperately needed from the next town.

"What of modernity has centered in the capital seems never to have been strong enough to permeate to the provinces. One can travel far in Mexico and keep unbroken the impression of a purely primitive civilization. I went for days on horseback through the state of Guerrero, which is one of the naturally richest states in Mexico. In its bigness, beauty, and fertility, I was thinking constantly of California in the spring. Yet the road from its capital, Chilpancingo, to its biggest seaport, Acapulco (one of the finest natural harbors in the world), is an almost impassable trail over the mountains, so rough only burros can take freight over, so narrow in many places only one burro can pass at a time."—*The Literary Digest*, Dec. 11, 1920.

MINOR NAVAL POWERS.—Although it is now generally admitted as a result of the experience of the war that the battleship remains the final arbiter of sea power and the unit on which naval strength is built up, none of the nations in Europe seems in clined, in their present financial state, to consider the provision of new vessels of this class. At the same time, if the United States and Japan continue to make progress at their present rate it will be almost impossible for the policy of any great European Power which desires to remain in the front rank as a maritime nation not to be affected. As Germany and Russia may practically be ruled out of account, the only theater in which it is possible, though not a all probable, that a clash of interests may occur is the Mediterranean, and as was shown in these columns a month ago, Austria has disappeared from the list of first-class naval powers, and so far as competition between France and Italy goes, it is a race to reduce their naval commitment rather than otherwise.

The minor naval powers are in a more advantageous position in that they can proceed with the maintenance or development of their forces along pre-war lines without having to incur the enormous expense of

battleship construction. The recent exposition of the naval policy of Holland illustrates this clearly. While considering disarmament premature in present circumstances, and therefore opposing the reduction of the fleet, the Dutch Government takes the view that its defence by sea can be undertaken with "small material," such as coast defence ships, submarines, minelayers and aeroplanes, with a few light cruisers for service in the colonies. It is, therefore, only proceeding with the construction of two light cruisers, the *Java* and *Sumatra*, at Flushing and Amsterdam. Possibly these additions to the Netherlands Navy will influence Belgium to start a naval force, to consider which question a committee was appointed last year by the Defence Minister. A Naval Commission has also visited Devonport to inspect certain sloops with a view, it was understood, of purchasing one for the proposed Belgian Navy.

The Northern European Powers are exhibiting no keenness to augment their naval forces just now. Denmark, however, has recently taken the opportunity to acquire on favorable terms one of the surplus British sloops, and has bought the *Asphodel*, which was formally handed over to her at Harwich on July 6. Construction is also proceeding slowly on the coast defence ship *Niels Juel*, which was launched at Copenhagen in 1918, and is somewhat similar to her four existing armored ships. There is an absence of information from Norway, but Sweden is continuing the building of the armored cruisers *Drottning-Victoria* and *Gustav V.*, of 7605 tons, launched in 1917. As regards Poland, the hope is cherished that she may eventually have a small naval force of her own, and there is a British Naval Mission under Commander E. L. Wharton which is advising on technical questions, such as harbor development, mine-sweeping, and the like. The six ex-German torpedo boats to be handed to the Poles after disarmament for police duty will afford the nucleus of such a force. The Esthonian Navy has received the addition of the late Russian gunboat *Bobr*, and Latvia is desirous of starting a naval force of her own.

Another new nation aspiring to the possession of a small navy is Serbo-Czecho-Slovakia, which is due to receive a dozen torpedo boats from the former Austro-Hungarian Navy after they have been disarmed. Greece, too, which already has a respectable fleet, and knows how to use it, as was shown during her war with Turkey, is incorporating the Austrian destroyer *Ulau* and six torpedo boats. There is, however, no sign at present of any active competition between the minor powers such as involved heavy, expenditure on new ships before the war.—*The Army and Navy Gazette*, Nov. 13, 1920.

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NOTES ON INTERNATIONAL AFFAIRS

FROM NOVEMBER 10 TO DECEMBER 10

PREPARED BY

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UNITED STATES

SECRETARY COLBY VISITS SOUTH AMERICA.—On December 4 Secretary of State Bainbridge Colby, accompanied by a staff of army and naval officers and department officials, left Hampton Roads in the U. S. S. *Florida* to visit Brazil, Argentina, and Uruguay as representative of the nation, to repay official visits made by public men of those countries.

TREATY NEGOTIATIONS WITH MEXICO.—On November 30, the eve of General Obregon's inauguration as President of Mexico, Secretary Colby made public a letter to the Mexican special representative, Robert V. Pesqueira, formally proposing that "commissioners be promptly designated by both Mexico and the United States to formulate a treaty, embodying the agreements that have been reached." The letter cites with approval the declarations of President de la Huerta and President-elect Obregon that Article 27 of the Mexican Constitution "is not and must not be interpreted as retroactive or violative of valid property rights." It also approves Mexico's proposal for a joint commission to arbitrate claims of other countries.

DIFFICULTIES AT CABLES CONFERENCE.—Difficulties arising at the preliminary communications conference held at Washington in November and December led Acting Secretary of State Davis on December 10 to lay the points at issue before the Senate Foreign Committee. In general, the Allied Powers favor government control of cables, and claim that rates can be made much cheaper under such control. Private companies in the United States raise objections based on the censorship and control that may be exercised by foreign governments both in peace and in war.

The chief objection of the United States is to the desire of Japan to control the island of Yap in the Pacific, which is on one cable line from Guam to Manila, and at the junction of the cables from the Dutch Indies and Shanghai to San Francisco. The future of Yap was discussed at the Peace Conference and it was proposed that the United States should be permitted to acquire the island. Japan opposed this and at present has possession of the station.

It was stated at the conference on December 10 that Great Britain had agreed to turn over the former German cable from New York to Emden, in return for the transfer to Great Britain of one of the American cables to serve England and Canada. A proposal was made that the German cable

from Brest to New York via the Azores, now held by France, should be diverted to Genoa from the Azores and divided between Italy and the United States. To this plan, however, France offered determined opposition.

INSISTS ON RIGHT TO REVIEW MANDATE TERMS.—An important note from Secretary Colby to the British Foreign Office on November 20 insisted that the terms of mandate grants and the various agreements relating thereto are the proper concern not only of the Council of the League of Nations, but of the United States and all other nations associated with the Allies in the war. The note is thus quoted and summarized:

"Such powers as the allied and associated nations may enjoy or wield in the determination of the governmental status of the mandated areas accrued to them as a direct result of the war against the Central Powers. The United States as a participant in that conflict and as a contributor to its successful issue, cannot consider any of the associated powers, the smallest not less than itself, debarred from the discussion of any of its consequences or from participation in the rights and privileges secured under the mandates provided for in the treaties of peace."

The specific point is made that the provision of the San Remo petroleum agreement between Great Britain and France that any private petroleum company which may develop the Mesopotamian oil fields shall be under permanent British control fails to agree with the statements in the British note of August 9, "that the petroleum resources of Mesopotamia, and freedom of action in regard thereto, will be secured to the future Arab State, as yet unorganized," and "that concessionary claims relating to these resources still remain in their pre-war position, and have yet to receive with the establishment of the Arab State, the equitable consideration promised by his Majesty's Government."

Mr. Colby argues that the matter of Mesopotamian resources is "an outstanding illustration of the kind of economic question with reference to which, the mandate principle was especially designed, and, indeed, a peculiarly critical test of the good faith of the nations, which have given their adherence to the principle."

Importance of Oil Resources.—He further insists that "because of the shortage of petroleum, its constantly imcreasing commercial importance and the continuing necessity of replenishing the world's supply by drawing upon the latent resources of undeveloped regions, it is of the highest importance to apply to the petroleum industry the most enlightened principle, recognized by nations as appropriate for the peaceful ordering of their economic relations."

While the American note accepts British assurances that the British Government has refrained from exploiting resources of mandate territories and welcomes the pledge that Great Britain does not intend to set up "any kind of monopoly or preferred position in its own interest," it recalls the fact that the United States supported the mandate principle primarily on the ground that "it is of the utmost importance to the future peace of the world that alien territory transferred as a result of the war with the Central Powers should be held and administered in such a way as to assure equal treatment to the commerce and to the citizens of all nations."

Referring to a statement in the British note that the draft mandates for Mesopotamia and Palestine, when approved by the interested allied powers, would be "communicated to the Council of the League of Nations," Mr. Colby says:

"The United States is undoubtedly one of the powers directly interested in the terms of the mandates and I, therefore, request that the draft mandate forms be communicated to this Government for its consideration before their submission to the Council of the League."

Then the Secretary adds:

"It would seem essential that suitable publicity should be given to the drafts of mandates which it is the intention to submit to the Council in order that the fullest opportunity may be afforded to consider their terms in relation to the obligations assumed by the mandatory power and the respective interests of all governments which are or deem themselves concerned or affected."—*N. Y. Times*, Nov. 26, 1920.

GREAT BRITAIN AND IRELAND

LLOYD GEORGE DECLARES MARTIAL LAW FOR IRELAND.—In an important announcement of government policy on December 10, Premier Lloyd George declared it was the intention of the British Government to establish martial law in parts of Ireland and to intensify its campaign against "the small, but highly organized and desperate minority" who were "using murder and outrage to attain the impossible." He declared at the same time that the government would treat with Sinn Fein members of the British parliament who had not been "involved in the commission of serious crimes," and that conferences with these Irish representatives had already taken place in London with valuable results. On December 10 martial law was proclaimed in the counties of Cork, Limerick, Tipperary, and Kerry.

HOME RULE BILL PASSES COMMONS.—The Irish Home Rule Bill passed the House of Commons on November 11. This bill provides separate legislatures of two houses each for the North and the South of Ireland, but in general withholds control of foreign relations, military affairs, and finance.

ADRIATIC SETTLEMENT

ITALIAN-JUGOSLAV TREATY SIGNED AT RAPALLO.—Italy and Jugoslavia reached an agreement regarding Fiume and the Dalmatian coast in a treaty signed at Rapallo on November 12. The terms of this treaty make Fiume an independent state, without League control. Italy secures a frontier touching that of Fiume on the west, and thus eliminating the strip of Jugoslav territory between which was favored by President Wilson. Jugoslavia gets as a port the suburb of Sushak near Fiume and all of Dalmatia save the port of Zara, the ancient capital with a population of 32,000, which goes to Italy. Of the Adriatic islands Italy takes only Cherso, Lussin, Lissa, and Lagosta. Albania is left intact.

D'ANNUNZIO HOSTILE TO TREATY.—Following the treaty, d'Annunzio at Fiume still insisted on the recognition of his government, "the Italian regency of Quarnero," which would be practically equivalent to recognition of Italian control. To this Italy could not see her way clear, in view of her agreements with the powers, and friction between Italian and d'Annunzio forces on the Fiume frontier became serious. In mid-December Italy's difficulties in disposing of her soldier-poet remained unsolved.

GREECE

VENIZELOS DEFEATED.—The Greek parliamentary elections of November 14 resulted in a sweeping victory for the opponents of Venizelos. Following the elections the Venizelos cabinet at once resigned and the former Premier left the country. At the request of the regent, Admiral Condouriotis, former Premier and Minister of Finance George Rhallis undertook the organization of a new cabinet. The result of the election was interpreted as indicating weariness of Venizelos' policy of warfare and expansion and a desire for the return of Constantine. The Rhallis Cabinet, however, declared for continuation of the former administration's foreign policy and of the war in Asia Minor against the Turks.

ALLIED NOTES OF WARNING.—Following a conference of Allied premiers in London, a note of warning was despatched to Greece declaring in effect that the return of Constantine might mean withdrawal of financial support and modification of the Turkish Peace Treaty so as to deprive Greece of certain of her territorial accessions. The note read as follows:

"The British, French and Italian governments have constantly in the past given proof of their good-will toward the Greek people and have favored the attainment of their secular aspirations. They therefore have been all the more painfully surprised by the events which have just occurred in Greece.

"They have no wish to interfere in the internal affairs of Greece, but feel bound to declare publicly that restoration of the throne of Greece to a King whose disloyal attitude and conduct toward the Allies during the war caused them great embarrassment and loss could only be regarded by them as ratification by Greece of his hostile acts. This step would create a new and unfavorable situation in the relations between Greece and the Allies, and in that case the three governments reserve to themselves complete liberty in dealing with the situation thus created."

Another note protested against a recent currency issue of the new administration and called attention to the fact that by an agreement of 1897 France and Great Britain exercised supervision of Greek currency.

As regards the situation in Asia Minor, press reports indicated that England favored a policy of continued support for Greece in the hope of retaining the use of her army, whereas France preferred to treat with Turkish nationalist leaders.

GREEKS VOTE FOR CONSTANTINE'S RETURN.—Despite the cold attitude of the Allied powers, the Greek plebiscite on December 5 resulted in an overwhelming vote—about 99% of the total—for the restoration of Constantine. The government reported the result to Constantine in Switzerland, who made plans for his return about December 15.

ARMENIA AND TURKEY

LEAGUE EFFORTS FOR ARMENIA.—On November 20, after heated discussions in which the lack of a League army was deplored, the League of Nations assembly passed a resolution requesting the Council to seek some power to intervene in favor of Armenia. (This action was taken prior to

the news of Armenia's adoption of a Soviet form of government and of peace with the Turks.) In accordance with the resolution, the Council extended an invitation to President Wilson to act as mediator, and the President on November 30 accepted. The President's reply was as follows:

"November 30, 1920.

"M. Paul Hymans, President, Council of the League of Nations, Geneva, Switzerland:

"I have the honor to acknowledge the receipt of your cabled message setting forth the resolution adopted by the Assembly of the League of Nations requesting the Council of the League to arrive at an understanding with the governments with a view to intrusting a power with the task of taking the necessary measures to stop the hostilities in Armenia.

"You offered to the United States the opportunity of undertaking the humanitarian task of using its good offices to end the present tragedy being enacted in Armenia, and you assure me that your proposal involves no repetition of the invitation to accept a mandate for Armenia.

"While the invitation to accept the mandate for Armenia has been rejected by the Senate of the United States, this country has repeatedly declared its solicitude for the fate and welfare of the Armenian people in a manner and to an extent that justifies you in saying that the fate of Armenia has always been of special interest to the American people.

"I am without authorization to offer or employ the military forces of the United States in any project for the relief of Armenia, and any material contribution would require the authorization of the Congress, which is not now in session, and whose action I could not forecast.

"I am willing, however, upon assurances of the moral and diplomatic support of the principal powers and in a spirit of sympathetic response to the request of the Council of the League of Nations to use my good offices and to proffer my personal mediation through a representative whom I may designate to end the hostilities that are now being waged against the Armenian people and to bring peace and accord to the contending parties, relying upon the Council of the League of Nations to suggest to me the avenues through which my proffer should be conveyed and the parties to whom it should be addressed.

(Signed) "WOODROW WILSON."

PROPOSED AMERICAN LOAN.—In acknowledging President Wilson's acceptance, the Council of the League notified him that both Spain and Brazil were willing to participate in action of "moral and diplomatic character" and had been requested to communicate directly with the President.

In his message to Congress on December 7 President Wilson suggested that Congress authorize a loan to Armenia, and the State Department later announced, that unless Congress indicated disapproval, the outgoing administration planned to grant a loan up to $25,000,000 under proper safeguards.

President Wilson on December 9 delivered to the French Foreign Office his decision as arbiter of the Armenian boundary question. The only comment from the recipients was that the document, with a thick book of maps, was one of the most magnificent ever received, and that the President had allowed Armenia very liberal borders.

TURKS FORCE ARMENIANS TO TERMS.—From Constantinople on November 23 came reports of an alliance between Soviet Russia and the Turkish Nationalists under Mustapha Kemil Pasha, the two partners agreeing to aid each other in "liberating" former Moslem territory and in hostility against the Entente powers. Subsequently it was announced that Armenia had shifted to a Soviet form of government and had turned to Russia for assistance against the Turks. Russia proceeded to warn her Turkish ally against encroachments on Armenian territory.

Finally came news of a peace between the Turks and Armenia signed on December 2, by which Armenia was forced to adopt a Soviet government and reduced to a small district around the capital Erivan.

RUSSIA AND POLAND

ARMISTICE BETWEEN LITHUANIANS AND ZELLGOUSKI.—An appeal from Lithuania reached the League Assembly at Geneva on November 21 declaring that the forces under General Zellgouski were attacking in 15 divisions and were receiving secret support from Poland. Lithuania requested the League to take action under Article XVI of the Covenant which enjoins members of the League against war without first using all reasonable measures to avoid a conflict. At this time the League had already decided to send an armed force—consisting of French, Belgian, British, Dutch, Spanish, Danish, Swedish, and Norwegian contingents—to maintain order during the plebiscite to be taken some months hence under League auspices in the disputed territory.

On November 31, through the efforts of the League commission on the scene, an armistice was signed between Lithuania and the Polish insurgent Zellgouski, providing for cessation of hostilities, return of prisoners, and establishment of a neutral zone.

POLISH-RUSSIAN NEGOTIATIONS DELAYED.—On November 20 negotiations at Riga between Poland and Soviet Russia were interrupted by Russia's accusation that Poland was disregarding the terms of the armistice by failing to withdraw troops from Ukrania. The downfall of all anti-Red forces in Southern Russia made Poland again apprehensive of Soviet aggression.

PLOT TO INVOLVE AMERICA AND JAPAN.—Passages quoted from a speech by Lenin at Moscow in November have been taken to mean that concessions in Liberia granted to the American Washington D. Vanderlip were made for the purpose of increasing friction between the United States and Japan. The significant passages of the speech ran as follows:

"The world revolution, without which our final triumph is impossible, has not developed as quickly as we hoped, still we must bear up till it comes," he said. "Though other countries consider war against us the only means to ward off revolution, they have been compelled to cease military operations against Soviet Russia, and our existence among the non-Soviet countries seems secured now. Meanwhile the revolution will have a chance to develop in those countries.

"Our nation, which for three years resisted imperialism everywhere, has become an international factor. By granting mining and industrial con-

cessions to America we disturb relations between Japan and the United States. We shall make the best of this situation. By granting such concessions we shall gain further material success over the capitalist countries because, instead of fighting us, they will be compelled to watch over our security. We must grant such concessions because one solitary nation cannot defeat the capitalism of the whole world."

LEAGUE OF NATIONS

ASSEMBLY ORGANIZED AT GENEVA.—Representatives of 41 states gathered at Geneva on November 15 at the first meeting of the Assembly of the League of Nations, which continued in session until the latter part of December. The work of the Assembly consisted chiefly of the organization of bureaus, commissions, and other machinery for the handling of international affairs, in case the League should get safely under way. Debates during the session brought out opposition between the great and the smaller nations, between European and non-European states, and against the present domination of the League Council by the Entente powers.

In a speech of welcome President Motta of the Swiss delegation expressed the general hope and desire that the United States should soon enter the League. Paul Hymans of Belgium was elected permanent President. The difficult question of the boundary dispute between Bolivia, Peru, and Chili, involving the application of the Monroe Doctrine, was postponed by request of the nations concerned. The following commissions and chairmen were appointed: General Organization (Balfour, British); Technical Organization (Tittoni, Ital.); Court of International Justice (Bourgeois, French); Finances (de Leon, Spanish); New Members (Humeus, Chili); Disarmament, Blockade, and Mandates (Brantung, Sweden). These committees at once began work, after the decision that committee meetings should be secret, but that committees could hold public sessions if they so chose.

COMPOSITE MILITARY FORCE FOR LITHUANIA.—At the opening of the Geneva session it was decided that various European members of the League, including Great Britain, France, Belgium, Spain, Holland, Denmark, Norway and Sweden, should be asked to supply contingents for a composite force to maintain order and supervise the proposed plebiscite in Vilna and the surrounding territory. It was announced later that Spain, Holland, and other states had given full or conditional assent to this plan. The meaning of Article X was settled by acceptance of the position taken by Denmark and Holland that the consent of parliament was necessary before those governments could contribute troops.

PERMANENT MANDATES COMMISSION.—In accordance with a plan presented by the Assembly Mandates Commission, it was decided by the League Council on November 29 that a permanent Mandates Commission should be created, representing five non-mandatory and four mandatory powers, that these members should all be named by the Council, and that they should not hold positions making them in any way dependent upon their respective governments. The Mandates Commission will sit at Geneva and will receive annual reports from the mandatory powers. In any controversy the representative of a nation involved will not be entitled to vote.

APPLICATIONS FOR MEMBERSHIP.—At the opening of the Assembly it was decided that applications for entrance into the League on the part of Austria, Bulgaria, and Albania should be given consideration, though their applications were filed after October 14, which was the time limit set.

On December 9 the commission on new members reported favorably in the case of Bulgaria. Finland and Austria were also given favorable consideration. As for Albania, Armenia, Ukrainia, and the Baltic states formed out of former Russian territory, it was thought for various reasons that conditions did not at present warrant their admission as independent nations.

Geneva, November 21 (Associated Press).—The Committee on Admission of New Members is considering the application of fourteen states, including Germany. These applications are:

From Finland, Esthonia, Letvia, Lithuania and Luxembourg, referred to the sub-committee presided over by M. Poullet.

Austria, Bulgaria, Albania and Lichtenstein, referred to the sub-committee presided over by Lord Robert Cecil.

Georgia, Armenia, Azerbaijan, Ukraine and Costa Rica, the sub-committee presided over by Dr. Fridtjof Nansen.

The committees will consider the following questions: Is its application in order? Is the government applying recognized de jure or de facto, and by which states? Is the applicant nation possessed of a stable government and settled frontiers? What are its size and population? Is it self-governing? What has been its conduct, including both acts and assurances, with regard to its international relations?

The last-named question is supposed to have been inspired by the French member of the committee, M. Viviani, with a view to any proposition that may be submitted to elect Germany.

INTERNATIONAL COURT.—While a majority of the commission on an International Court favored compulsory jurisdiction, the opposition of the British member led the commission for reasons of practical policy to accede to the previous decision of the League Council in favor of granting jurisdiction only in cases where both parties were willing. In view of the strong sentiment for compulsory jurisdiction, however, a proposal was made that nations might signify their acceptance of it, and that it should operate in cases between nations thus committed to the plan. The Council appointed a committee of ten jurists to complete definite plans for the organization of the court.

NO INTERNATIONAL CREDIT INSTITUTION.—The Committee on Finances and Economics decided that it would not act at present on the suggestion of the Brussels Financial Conference that a committee of financiers be chosen to lay plans for an international credit institution. The committee appears to be of the same opinion as the Council of the League that this is a question in which precipitate action would be unwise.

If the Assembly approves the committee's decision, another international financial conference will be held next year before anything is done on the suggestions made at the Brussels conference. This is understood to be the plan advocated by the British.

PLANS FOR DISARMAMENT.—On December 1 the League Council sent the following invitation to the United States to send a representative to take part in discussions of disarmament:

"To the Government of the United States:

"The Council of the League of Nations, acting on the unanimous recommendation of the permanent Military, Naval and Air Committee passed at a meeting at Geneva on November 25, invites the government of the United States to name a representative to sit on this committee in a consultative capacity during its study of the question of the reduction of armament, a study which the Council has asked the committee to undertake forthwith."

This permanent Advisory Committee was constituted by the Council at its meeting in Rome, and held its first session at San Sebastian. It is composed of military, naval and air officers of the states represented on the Council. Its decisions are purely advisory and not in any sense binding, but they represent the commission's technical judgment as formulated by the experts of many countries.

It would, of course, be perfectly understood that the presence of Americans on the committee would not commit the United States Government with regard to the final report. Indeed, the report itself will not be more than a basis for consideration by the members of the Assembly of means for the reduction of armaments, which united action may enable it to achieve. Nevertheless, just as in Brussels, the presence of American representatives whose function was only to give and receive information was an important factor in the success of that conference, so the general consideration of disarmament will be greatly facilitated if the American Government can be represented at the sessions of the Advisory Committee.

The problem is one to which public opinion everywhere attaches the highest importance. It is needless to say that a reduction of armaments is necessary for the well-being of the world, and, unless relief can be found for the general economic situation by international cooperation to obtain a reduction of the taxation required to maintain armaments, it must become worse. The Council in sending this invitation cannot but hope that the American Government, especially in view of the past attitude of the country toward disarmament, will not refuse the proposed association with the government of the League in beginning the preliminary work necessary for ultimate success and in lending to the present effort its assistance, which can in no way encroach on its own perfect liberty of action.

To this invitation the American Department of State replied that since the United States was not a member of the League, it could not send a representative to take part even in a consultative capacity. On December 11 Senator Walsh introduced a resolution in the U. S. Senate proposing that the President be requested to appoint a delegate to the Disarmament Commission. The resolution was referred to the Committee on Foreign Relations.

Geneva, December 11.—Japan can not reduce her armaments as long as the United States is increasing hers, Viscount Kikujiro Ishii of the Japanese delegation declared at a meeting of the armaments committee of the League of Nations this afternoon when the question of disarmament was under discussion.

Disarmament in three stages is the substance of the recommendation the committee will make to the Assembly as the result of its deliberations. The first stage would be marked by an agreement among the powers to make no further increases in armaments.

The second stage of the recommended procedure is a gradual reduction in armaments.

The third stage would be that of general complete disarmament, except insofar as arms were needed for police purposes.

RELATION OF ASSEMBLY AND COUNCIL.—The Permanent Rules of the Assembly, adopted on November 30, provided among other things that the Assembly should meet each year on the first Monday in September. In a committee report on the relations of Council and Assembly, it was pointed out that the two bodies could not be regarded as upper and lower houses, or as legislative and executive bodies, but must rather be regarded as two instrumentalities without analogy in constitutional law.

The report then went on to review where each has jurisdiction. Various matters are placed under the League in the covenant, but the covenant does not always state whether the Council or the League is intended. In conclusion, the following views are presented:

"First, the Council and the Assembly are each invested in part with powers and duties, neither body has the jurisdiction to render a decision in a matter which is common to the other.

"Second, the Assembly has no power to reject or modify a decision which falls within the exclusive province of the Council. The same respect must also be shown by the Council for the decision of the Assembly.

"Third, under the covenant the representatives sitting in the Council and the Assembly render the decisions of their respective states and in rendering the decisions they have no standing except as such representatives.

"Fourth, the Council will present a report each year to the Assembly."

AMENDMENTS POSTPONED.—On December 1 the Assembly accepted a report of the Amendments Commission postponing discussion of changes in the League Covenant until the next session. On this question of procedure, Senor Pueyrredon, Argentine Premier and head of the Argentine delegation, voted in the negative, and afterward withdrew from the Assembly.

This action of the Argentine delegate created a sensation, and was taken by opponents of the League as significant of its inevitable and speedy dissolution. Senor Pueyrredon, however, declared himself a firm believer in the idea of a world league. The amendments which he wished to bring before the Assembly, and refusal to consider which caused him to withdraw, were designed to take the League out of the control of the victorious Allies. He proposed changes in the method of electing the Council, and another amendment providing that all states who did not remain outside of their own choice should be at once admitted to the League.

ATTACK ON ARTICLE X.—On December 4 one of the Canadian delegates moved to eliminate Article X from the League Covenant. Another Canadian delegate later spoke vigorously against the powers accorded to the various League bureaus, which would sit permanently in Europe and which non-European delegates could not easily attend. He objected to a League dominated by Europe. The discussion of Article X was postponed until the next session, with Canada's consent. The speech on the article was as follows:

"My motion should surprise no one," he said. "It is a continuance of the old fight made by the Canadian representatives at the Peace Confer-

ence against Article X. Their protests were vain. Afterward, when the covenant came before our Parliament, it was proposed to ratify it with a reservation on this point, but finally it was decided that Canada could do better work to get Article X removed from inside the League than by making an outside protest of this character at that time.

"I am sure that the United States will see the justice of the Canadian viewpoint. In point of fact, the article is nothing but a humbug. Every one knows that it cannot be enforced. We are opposed to it on principle. It is an endorsement of the territorial lines laid down in the Peace Treaty. It is also unfair.

"Canada, for instance, is like a man living in a fireproof house who is forced to take out an insurance policy like some one whose home is surrounded by kegs of gunpowder. If guarantees were necessary for the protection of nations less fortunately situated than ourselves, they might be supplied by the four big powers chiefly concerned, who are armed for the purpose sufficiently and whose interests are at stake."

REVIEW OF BOOKS

"Modern History of Warships." By William Hovgaard. (Published by Spon and Chamberlain, 120 Liberty Street, New York.)

This book is based on lectures given by Professor Hovgaard in his course in Naval Construction at the Massachusetts Institute of Technology. It is really a preliminary text-book, or an introduction, to his "Structural Design of Warships," for, as stated in the preface a historical study of the development of various types of war vessels is necessary before a student can properly appreciate the present state of the art of warship construction.

The book is the result of exhaustive search of official reports, the technical press, and other publications dealing with the characteristics of naval vessels, their performance, and service injuries in peace as well as war, and contains data chronologically arranged which is not to be found elsewhere in one publication. The period covered extends from the introduction of steam and iron for vessels, early in the nineteenth century, down down to the latest 1918-1919 types, starting with Fulton's *Demologos,* the first steam propelled warship, and carrying on through all the evolutions to the British *Hood* and our own *California* class. The comprehensiveness of the book is indicated by a chapter on aircraft, and by others dealing with the development of propulsive machinery, ordnance, and armor. There are numerous illustrations, principally diagrammatic or outline sketches to supplement the text which is far from being a compilation of names, characteristics, and dates. The author very aptly describes the book in saying it is intended "to give a critical discussion of the various types of warships, and to explain the causes—political, military, and technical—which have influenced and directed the evolution."

There are fourteen chapters of text, the first eight, comprising approximately three-fourths of the book, discuss the development of war craft of the several types; then five of a more technical character treating of the development of the design and construction of the hull, propulsive machinery, armament, mines, torpedoes, and armor; and a final chapter giving the author's conclusions as to the present state of the art and the trend of development in the "nearest future."

The development of warships is covered by chapters on armored battleships, cruisers, vessels of special type, gunboats, surface torpedo vessels, submarines, and aircraft. Each main subject is discussel at length for the navies of the large powers, Great Britain, United States, France, Italy, Germany, and Japan, with brief mention of minor navies. The causes of losses of ships and lessons learned from such fatalities are appropriately mentioned as are also the more important trial or experimental vessels. Among the most interesting and instructive parts of the book are the remarks on war experiences at the end of the chapters on battle cruisers, destroyers, submarines and aircraft.

The chapter on battleships is the most extensive in the book as is to be expected from the importance of the subject and on account of this type including many of the important features of others. The submarine chapter is specially interesting and covers not only the development of submarines, but also a discussion of their use in war. The five chapters on development of hull, machinery, armor, etc., do not cover the subjects as fully as has been done for the types of ships, but contain interesting historical data, and are well worth reading. While the book is best suited for students of Naval Construction it contains much material of value and interest to all connected with the naval profession. Those engaged in designing or determining the military characteristics of ships should have a general knowledge of the history of the development of the several types, should study the conditions met in service, should investigate results of damage in peace as well as that inflicted in war, and should be familiar with what has so far been accomplished and the future possibilities. A study of Professor Hovgaard's book will put one well on the way in acquiring the above mentioned information. It should be read by all officers of the Construction Corps, and by all others who are interested in the evolution and development of our fighting vessels. The author considers that his work will be useful, both in the study of naval construction and in that of military science. That this belief is well founded will undoubtedly be agreed upon by all its readers.

W. G. D.

"Balistica Exterior Telemetria y Tiro Naval." By Manuel Vela and James Janer.

The work "Balistica Exterior, Telemetria y Tiro Naval" is, it appears, the first work treating of this subject which has been published in Spanish. Such a work was necessary in order that naval officers of Spanish-speaking countries might solve the many problems presented by gunnery.

The well-known book "Artilleria de Naval" by Hermida describes the matériel in use at the time of its publication and treats of exterior ballistics and of some gunnery problems; but it is now somewhat obsolete and whatever information a "man-of-war's man" required was to be found only in foreign works, the compilation and translation of which was an arduous task.

The book of the Senores Vela y Janez fills this need. The authors omit all description of ordnance material, explaining instead, at suitable length, the fundamental principles of gunnery, the verification of theories, the calculation of corrections, probabilities, etc.

In general, and for the treatment in one book of such problems as may present themselves to the officer, and as a study of ordnance for a midshipman, the work is more extensive than that of Alger, which is that used in the North American Navy. Nevertheless the authors of the work have translated several chapters from Alger's book and have followed in the development the same system as Alger.

The study which the authors make of the effect of rotation on the trajectories of long range and duration, the correction for the curvature of the same, and the similarity between the movement of the gyroscope and ogival projectiles, is interesting.

The authors also concern themselves with a study of the gunnery errors due to roll and pitch; of delays in firing, and of the corrections for the difference in the situation of range finder and gun; and in pages 190 to 192 they discuss the underwater velocities of projectiles.

In Part II there is an explanation of the method the authors use for the calculation of trajectories for large angles of elevation (anti-aircraft fire). In this part there is also a study of rifle fire.

The study made in Part III of range finding, range finder errors, method of adjustment, etc., is all as complete as could be given in a text-book, being sufficient to serve as a basis for the solution of any range finder problem.

Finally, in Parts IV and V there is studied the practical application of the fundamentals of gunnery in the cases of a fleet action, defense against destroyer attack, firing on a coast, fire with landing force guns, etc. There is discussed further the influence that atmospheric refraction exercises in limiting maximum gunnery ranges, heighth of the guns of their director stations, observation of fire, etc.

As an appendix a study is made of "curved fire" and of the constitution and principal characteristics of the explosives normally employed in naval artillery.

J. R.

"The Airplane." By Frederick Bedell.

In this book Dr. Bedell has explained in a simple, clear manner the fundamental problems of flight. Such a general treatment is probably of most value to the general reader who desires to know the engineering principles involved in an airplane, but is not interested in their detail application. The treatment is essentially non-mathematical and obviously avoids the more obscure relations and the results of more recent invention and research. The book can hardly be called superficial and the treatment within the limits the author sets himself is entirely sound. However, when mathematics is avoided those questions which cannot easily be explained by words and diagrams have to be omitted for the sake of clearness. In particular, the chapters on stability are rather thin, although a quantitative discussion is given of the various factors that affect stability.

The book discusses the general mechanics of flight and is not concerned with structural matters nor the construction of the various types of airplanes and seaplanes and their accessories and equipment.

In general, the book is an easy first course for a man who is curious about the principles of flight. The reader should not, however, conclude that the motion of an airplane is quite as simple and easily understood as Dr. Bedell's book. It is Dr. Bedell's skill in clear exposition which makes the subject seem easy, together with his caution in eliminating.

J. C. H.

"A Guide to the Military History of the World: War 1914-1918." By Thomas G. Frotheringham, U. S. R. (Boston: Little Brown & Co.)

It is hard to conceive of a more difficult task than that which has been accomplished by the author in this one short volume. It is safe to say that any reader that is not gripped by the vigor and simplicity—the obvious fairness, the clear and concise method of handling material that has hitherto been bewilderingly confused, must give up hope of ever finding an easier or more delightful method of informing himself of the greatest period in the history of the world. This too in the face of the fact that the public has been fed up *ad nauseum* for the last six years with every form of war stuff from newspaper propaganda to official reports and biographies of the chief participants. And yet the net result has been hitherto only a mountainous mass of doubtful information that has apparently baffled every attempt to winnow out intelligible history. The labor of condensing a library into a single volume suggests a task greater than producing the library itself; yet the style is so easy and straightforward that we wonder why it was not done before. A clue to the author's method is found in the opening quotation, "The key to any mass of evidence is a narrative synopsis of the actual events." With this as a motto the author keeps right in mid-channel throughout and avoids all the rocks, shoals and hazards in the shape of non-essentials that would certainly lure aside anyone that had not his genius for steering a straight course.

It is the only book that we have seen that gives a clear and concise account of each phase of the war in its relation to the war as a whole.

An excellent feature is the original maps that fold out so that they may be studied in connection with the text. These maps are especially devised to show only the essentials and save time and temper that are often exhausted in groping through the wilderness of detail of the ordinary map.

For naval students the account of the Battle of Jutland will be found of unusual interest. It clears up many obscure points in this most confused of battles. The author has carefully analyzed and balanced the conflicting British and German accounts and at the same time has made the narrative so simple as to be intelligible even to a school boy.

This book is recommended to the public in general and to the student. The first because we all should be correctly informed of this great period through which we have lived and the second that the student may be properly oriented to take up intelligently the study of details now buried in official reports and technical papers. For this reason it seems especially adapted for use as a text book in schools and should be found in every public library. The events with which it deals are so recent that its unbiased historical perspective is as unexpected as it is refreshing.

It is our opinion that this book will live. Nothing short of a masterpiece could rise above the flood of war books that have appeared and it is not surprising that it should be acclaimed abroad as well as here because it is—masterly.

L. Mc. N.

"La Guerre Avec Le Sourire." By Captain Nemo.

Selected with great cleverness is his title "War with a Smile" it describes valuable service rendered by the Naval Brigade of 6000 men under Vice Admiral Ronarch during the early part of the World War and especially their obstinate and sturdy defences of Dixmude and their tenacity with which they clung to the left bank of the River Yser under conditions that try men's souls and break down the morale of the sturdiest troops. In his introduction he tells us "Smile, is for us, the French people, the talisman of the Arabian Knights, the palladium of the ancient citadel, the emblem of success and the gage of victory. Preserve the smile and you are sure to win."

He starts with the assembling of the brigade in Rochfort and when it is hurried to Paris to replace the Police Force already drawn to the front. After many wanderings it slowly but surely arrives at the front and is thrown into the breach to oppose the drive of the Germans in their attempt to reach the Channel. With a smile they cling to their positions on the Yser for 33 days meeting their steady losses and the continuous bombardment with a sturdy philosophy with which they were accustomed to meet the pounding sea and howling gale.

The book is interesting throughout and is a tribute to the brilliant service which the French Naval Brigade, under Vice Admiral Ronarch rendered on the Western front and one which sister services will read with great interest.

R. H. J.

"L'action Maritime Pendenat la Guerre Anti-Germanique." By Rear Admiral Daveluy.

Rear Admiral Daveluy has already contributed a book on the Naval Lessons of the World War. In the two volumes under review he cites the operations of the War in chronological order and separated on a geographical plan. As far as practicable with available material now at hand these various operations seem to be quite accurate. The first volume is given over to operations in the North Sea 1914-15, then the operations of 1916, and especially the Battle of Jutland, and finally the operations of 1918 in the Northern Waters. A review of the situation in the Mediterranean up to the intervention of Italy and the operations on the Dardanelles. In the second volume the operations continue in the Mediterranean and Adriatic after which the various minor operations in distant seas are discussed.

It is needless to comment on the style and clearness with which Admiral Daveluy brings out his facts. The descriptions are brief and omit unnecessary details in the various actions. Finally at the end of those actions which would seem to call for comment a brief opinion of errors and mistakes is added as seen from his point of view.

Altogether it is an excellent review of the war from the point of view of the recognized expert in the French Navy on strategy, tactics and administration. It may well be taken as representing the general French opinion concerning the Naval Operations of the War.

R. H. J.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ARTICLE, 1922

A prize of two hundred dollars, with a gold medal and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best original article on any subject pertaining to the naval profession published in the PROCEEDINGS during the current year. The prize will be in addition to the author's compensation paid upon publication of the article.

On the opposite page are given suggested topics. Articles are not limited to these topics and no additional weight will be given an article in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. All original articles published in the PROCEEDINGS during 1921 shall be eligible for consideration for the prize.

2. No article received after October 1 will be available for publication in 1921. Articles received subsequent to October 1, if accepted, will be published as soon as practicable thereafter.

3. If, in the opinion of the Board of Control, the best article published during 1921 is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention," or such other distinction as the Board may decide.

4. In case one or more articles receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

5. The method adopted by the Board of Control in selecting the Prize Essay is as follows:

(a) Prior to the January meeting of the Board of Control each member will submit to the Secretary and Treasurer a list of the articles published during the year which, in the opinion of that member, are worthy of consideration for prize. From this a summarized list will be prepared giving titles, names of authors, and number of original lists on which each article appeared.

(b) At the January meeting of the Board of Control this summary will, by discussion, be narrowed down to a second list of not more than ten articles.

(c) Prior to the February meeting of the Board of Control, each member will submit his choice of five articles from the list of ten. These will be summarized as before.

(d) At the February meeting of the Board of Control this final summary will be considered. The Board will then decide by vote which articles shall finally be considered for prize and shall then proceed to determine the relative order of merit.

6. It is requested that all articles be submitted typewritten and in duplicate; articles submitted written in longhand and in single copy will, however, receive equal consideration.

7. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

H. K. HEWITT,
Commander, U. S. N., Secretary and Treasurer.